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DIFFERENTIAL DIAGNOSIS OF FUNCTIONAL AND ORGANIC NERVOUS DISORDERS*

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It would be well at the outset of the discussion to define the terms "functional" and "organic." Strictly speaking, all symptoms of illness are, of course, functional, in that they are manifestations of disordered function; but here I propose to use the word in a narrower sense as indicating those symptoms which are psychogenic. By "organic" will be meant symptoms which result from abnormal physical alterations in the nervous system. The word "abnormal" is advisedly used, for all forms of activity of the nervous system must be associated with physical changes. These morbid alterations may be so gross that they can easily be detected by the pathologist, and have long been recognized. Others are less obvious, and, like those in the basal ganglia in paralysis agitans, have only come to light in recent years through the development of histological technique. There is still another group of cases in which the symptom is believed to be organic, although structural changes may or may not be found post mortem; this group is largely composed of disorders of function which are transient and recurrent. During the attacks there may be present signs which are accepted as of organic significance—for example, in epilepsy, loss of consciousness, abolition of tendon reflexes, or extensor plantar responses—while in others, such as narcolepsy, there may be no physical signs of this order.

It is therefore clear that, although the pathologist has done much in the differentiation of organic from functional nervous disorders, the main burden has rested on the clinician, and still does. By the sifting of accumulated experience gained at the bedside, through careful investigation of the natural history of disorders, the characteristics of individual symptoms, and the searching for physical signs, he has led the way in differential diagnosis. The physical signs of organic disease are often crude and are comparatively few, but they are gradually becoming more refined and are increasing in number. But it is not only on the elicitation of physical signs that the physician ought to depend for differential diagnosis. Symptoms, including the patient's own sensations, have for long been taken seriously by the clinician, and will, in the future, yield information of the greatest value, for frequently they indicate the earliest stages of disordered function before structural changes develop of sufficient severity to give rise to physical signs. This leads up to the importance of careful history-taking, the methodical investigation of symptoms, and their temporal relationships. An adequate history should, of course, include an account of the patient's past illnesses and his habits, and of the health of his family. One should, in addition, attempt to get some idea of the main psychological influences that have affected him, particularly if diagnosis is uncertain. In other words, a proper medical history is one which recapitulates the life of the patient as a whole, of which his present illness forms but a part. "Disease" is a vital process with a natural history, and symptoms are not a series of isolated events.

Clinical Criteria of Differential Diagnosis

What, then, are the indications which have been proven to be of use in the separation of functional and organic nervous illnesses? The psychological aspect of the problem will be dealt with by Dr. Petrie, but let me say that the history of a psychoneurotic almost always shows a tendency, from childhood onwards, to face trouble badly. In the past, he may have been able to carry on with his work, and may not have broken down before; nevertheless, emotional disturbances have produced symptoms of a psychogenic kind. In fact, to borrow a definition, a neurotic is a person who is unable to strike a sensible bargain with existence. Dr. T. A. Ross, as the result of his great experience, stresses this point by saying that in an obscure case the diagnosis of a psychoneurosis should not be made in the absence of a psychogenic history. It may be argued, with justice, that every individual has his breaking-point, and that an anxiety, resulting from a threat to himself or to those to whom he is deeply attached, may precipitate a mental illness. But it is questionable whether the illness would persist for long if the individual possessed an average capacity for adaptation as shown by his behaviour in the past. If the present illness was not preceded by emotional strain, and if the past history shows that the ill person had passed through experiences distressing to him, and yet was able to adjust himself to them in an adequate manner, the symptoms which now trouble him, however much they may resemble those of a psychoneurosis, should not readily be accepted as such.

For example, sleeplessness at night with or without lethargy during the day is now a well-recognized symptom of lesions of the hypothalamus from various causes, and, when due to encephalitis lethargica, is often, especially in children, associated with irritability, tearfulness, and fear. Fatigability, a common complaint in neurotic persons, may also be an organic manifestation, as in Parkinsonism and myasthenia gravis. Certain headaches—for instance, those of intracranial hypertension—pains in the trunk and limbs as in tabes or polyneuritis, and the paraesthesia in subacute combined degeneration, are of the same order, but a careful analysis of such symptoms in the process of history-taking and a knowledge of features

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of organic significance should prevent many mistakes in diagnosis.

A single symptom such as sudden diplopia or misty vision in one eye, which persists for a few weeks, ought, especially in a young adult, to make one suspect organic disease. This suspicion becomes almost a certainty that one is dealing with a case of disseminated sclerosis if, as the story is unfolded, other transient disorders, like numbness and clumsiness of a limb, or hesitancy of micturition, are found to have occurred even after intervals of many years of good health, in spite of a complaint from the relatives that the patient has become more emotional than before. This symptom in itself is significant in such a story, for it is common for patients with disseminated sclerosis to laugh or cry too easily, and has undoubtedly an organic basis. To stress the meaning of a history of this kind is perhaps to underline the obvious, if it is supported by the presence of physical signs; but experience has shown that its diagnostic importance is not much diminished by the absence of physical abnormalities. They will almost certainly appear later.

Physical Signs

Coming to the physical signs of neurotic ailments, we can put to one side the exaggerated reactions to fear, at the same time remembering that they may be indications of mild hyperthyroidism, which is often mistaken for a psychoneurosis. It is sometimes difficult, or impossible, to say which is primary—the glandular disorder or the anxiety state. Long-continued emotional stress seems to stimulate thyroidal activity, and it may be said with some reason that the naturally over-anxious person has also, as a part of his heritage, an abnormally active thyroid gland. This association probably determines the onset of illness in many women who break down at the climacteric. The major part of the symptomatology of the so-called menopausal neurosis as well as the physical signs are those with which we are familiar at earlier periods of life in cases of mild hyperthyroidism. The neurotic physical signs which will be particularly discussed are those of hysteria. From the point of view of physical examination the diagnosis of hysteria rests on: (1) the absence of signs of organic disease; and (2) the presence of positive signs of hysteria.

Certain manifestations are invariably organic in origin. Of these the most important are dysphasia with or without dysgraphia, papilloedema and optic atrophy, nystagmus with the slow movement towards the rest position and the quick movement towards the object of fixation, absence of vestibular reactions, local muscular atrophy with alteration in the electrical excitability coming on within a few weeks of the onset of paralysis, inequality of the abdominal reflexes or the tendon jerks or abolition of the latter (the abdominal reflexes are difficult to obtain in people with lax abdominal walls), and a true extensor plantar reflex.

Many sensory abnormalities are of equal value. Some only will be mentioned, and others will be referred to later. Of defects in the visual fields, central scotoma for red and green, with reduction of visual acuity and homonymous or bitemporal field defects, especially if quadrantic, are important; so also is pain which consistently is in the distribution of spinal posterior roots, all the more if it is associated with cutaneous tenderness or sensory loss. There are other pains, such as those of tic douloureux and the lightning pain of tabes, and the neuralgias of the head and face, due to sinus infection, which have features of their own. Certain varieties of sensory dissociation occur only from organic lesions. Obvious examples are the analgesia and thermo-anaesthesia of segmental distribution with preservation of tactile sensibility in syringomyelia and other central lesions of the spinal cord, and loss of postural sensibility with ataxia, diminished vibratory sense, and astereognosis as the predominant sensory defects from posterior column lesions.

To the unwary, however, some of these physical signs may appear to be present, whereas they are the result of faulty methods of examination or a lack of familiarity with normal variations. Thus, in testing the tendon jerks, care must be taken that the two limbs which are being compared are in the same position and the muscles relaxed. In regard to the plantar reflex, most stress should be laid on the response obtained from the outer edge of the sole, which is the focus of the receptive field for the reflex. With slight lesions of the pyramidal tract the abnormal reaction may be obtained only from this part, and stimulation of the rest of the sole may yield the normal downward movement of the toes. In doubtful cases help is usually obtained by observation of the reaction of the rest of the limb to plantar stimulation. In normal people who are not over-sensitive, the flexor plantar response is often accompanied by a quick contraction of the muscles in front of the thigh, whereas if the reflex is organically abnormal, whether the toes move up or fail to move, the limb flexors tend to contract. This contraction can be best appreciated in the hamstrings by feeling their tendons tighten. If then the toe response is different on the two sides, observation of the effects of the response on the quadriceps and hamstrings in each limb is often helpful. If the patient is over-sensitive, and especially if the stimulus is painful and applied roughly without due warning, the reaction in the limb is likely to be a sudden flexion or withdrawal of the limb, and the toes may either extend or flex. This is largely a voluntary response.

A superficially similar reaction is common in severe spastic paralysis of organic origin, but there are important differences. In the organic case, as the pin is being drawn along the sole from the back to the front of the foot, jerky flexion movements associated with extension of the toes commonly occur before the limb becomes vigorously flexed. Sometimes, however, violent withdrawal is almost immediate. Observation of the after-response is then of value. In the organic case, if the spasticity is more extensor than flexor, the limb, after a brief delay, is vigorously thrust out with the muscles in strong contraction, the toes being usually extended. Should the spasticity be predominantly in the flexor muscles of the limb, the subsequent reaction to withdrawal is slower and jerky. Once these reactions have been seen they can again be easily recognized. Usually, however, the response to stimulation of the sole is not the only available physical sign for diagnosis. The tendon reflexes, the reaction of the muscles, if rigid, to passive stretching and to voluntary efforts, are all of the greatest value. The final conclusion will rest on the whole available evidence.

The other source of fallacy lies in the want of recognition of normal variations—for example, the confusion between the haziness of the optic disk in a hypermetropic eye and papilloedema, and between a large physiological cup and optic atrophy; so also is apparent weakness of one side of the face and tongue the result of natural asymmetry of the facial bones.

Physical Signs of Hysteria

A psychoneurosis is the outcome of an attempt to solve a mental conflict. The imperfect and irrational solution results in illness which, as in anxiety states, still leaves the patient with fears and obsessions. In hysteria, however the development of a physical disability, such as paralysis or blindness, is, as a rule, completely satisfy-

ing, and with its appearance worry vanishes. "Belle indifference" has long been known to be characteristic of the simple hysteric whose anxiety returns if he is compelled by the suggestions from a personality he believes to be stronger than his own, or by sudden emotional shock, to give up his fears and obsessions. The cure of hysteria, therefore, demands not only the disappearance by suggestion and explanation of physical disabilities, but also a reasonable adjustment, satisfying to the patient, of the conflict which led to their appearance. Hysterical symptoms may, however, and frequently do, form an incidental part of other psychoneurotic illnesses, and psychotic states, such as depression and schizophrenia, as well as gross physical illnesses, are often not free from them.

Hysterical manifestations are mental in origin, and are determined by the individual's idea of what constitutes paralysis, loss of sensibility, or a fit. They do not, therefore, conform to the rules of pathological physiology and anatomy. It is this discrepancy that enables the physician to differentiate between signs of hysterical and those of organic origin.

Hysterical Paralysis

Almost the whole body, or one side of it, or a limb, or only the peripheral part of it may be affected. Paralysis limited to the adductors of the vocal cords, resulting in aphonia, is common. The distribution and form of the paralysis is determined by suggestion frequently provided by a physical illness or accident, which in itself is often trivial. Thus laryngitis may lead to aphonia, or a slight wound to the hand to paralysis of this part. The factor which determines the perpetuation of disability in hysterical form is a state of anxiety with consequent unhappiness, or a fear of the future, after the physical illness is over, and it may be that the patient unconsciously welcomes disablement so that he need not continue with disagreeable tasks or can attract sympathy, while at the same time the necessities of life, flavoured with luxuries, can be provided for him by others.

Characteristics of Hysterical Paralysis

It is often selective. All voluntary movement in the affected part may appear to be impossible, but there are no reflex signs of organic significance or wasting, unless the paralysis has lasted for many months. The paralysis may, however, be incomplete. In such cases two forms of reaction may be observed. The first is that the patient is unable to use certain muscles for one voluntary movement, while he is able to employ the same muscles for all other voluntary movements for which they are required. The following examples are illustrative. The hysterical aphonic talks in a whisper but can usually cough to command, equally a voluntary act. So also the act of writing is difficult or impossible in writer's cramp, although the hand is as good as ever for all other movements. That the paralysis represents an idea of disability is again shown by the case of the sergeant who, after fighting successfully for three years, quite naturally became tired of it, but discipline and a sense of duty compelled him to struggle on in spite of his desire to escape. During a bombing attack he was slightly wounded on the forearm, and soon after became unable to grasp a bomb or a rifle with his right hand, but never lost the power to use it for other purposes. The paralysis, which incapacitated him from fighting but for nothing else, enabled him to get the rest he required with preservation of his self-esteem.

Again, in the form of hysterical paralysis known as astasia-abasia, the inability is confined to standing and walking, for in bed all voluntary movements of the lower limbs can usually be well carried out. The same inconsistency can be observed in cases of ataxia. Thus, although the patient staggers in walking and sways when standing, especially if asked to do so with closed eyes, so long as these actions are in his mind, he will, nevertheless, stand steadily if his attention is directed to the examination of his pupillary reactions.

The second form of reaction consists of the display of excessive effort, which is manifest not only in a general way by clenched teeth and hands and of violent muscular exertion of the non-affected portion of the body as if the patient were trying to show that he was doing his best, but also by strong contraction of the opposing muscles at the joint of the affected limb which he is asked to move. Either no movement results, or it is accomplished in jerks due to irregular relaxation of the muscles opposed to the prime movers. These two modes of behaviour are diagnostic of hysteria, and, if recognized, cannot lead to confusion in diagnosis.

Passive movement of a paralysed limb in hysteria may evoke no resistance, or resistance of a diagnostic kind may be encountered. It is then proportionate to the effort expended by the physician in the sense that the more he tries to move the joint so the resistance steadily increases. This reaction, which is due to muscular spasm brought about by the unconscious or, more truly, the partially conscious efforts of the patient to resist, can easily be differentiated from the two common varieties of organic muscular rigidity. These are due to pyramidal and extrapyramidal motor lesions. When one attempts to bend the paralysed knee of a patient with spastic hemiplegia, the so-called clasp-knife rigidity is encountered. At first the movement is easy, then resistance is suddenly encountered, but if pressure is maintained it gives, although not completely, and the rest of the movement can be carried out fairly easily and with diminishing effort. In Parkinsonism the tonic reaction of the affected muscles is different. It is displayed throughout the whole movement at the joint, but is jerky, hence the term "cogwheel" rigidity. Its jerky character can, as a rule, in slight cases of Parkinsonism, be most easily detected at the wrist, but it should be remembered that the hand may have to be moved in flexion and extension several times before it appears.

The various contractures met with in hysteria are the result of muscular spasm, which increases when attempts are made to overcome the abnormal posture either by the patient or the physician. Furthermore, postures of the limbs always differ, at least in detail, from those of organic spastic states, and not uncommonly the hysterical contracture is limited to a hand or foot. That hysterical contracture is due to active spasm is well shown in cases in which there is apparent weakness of one half of the tongue. The tongue, say, is protruded to the right, but when withdrawn into the mouth it still deviates to the same side, whereas if the unilateral paralysis had been organic, retraction would inevitably cause deviation to the opposite side. So, also, hysterical diplopia with convergent squint is the result of voluntary or semi-voluntary contraction of the internal recti.

No manifestation of hysteria can be recognized so quickly as the manifold disorders of gait. One or both limbs may be affected. The patient may drag the paralysed limb along behind him with the foot firmly scraping along the floor, or will ostentatiously, in his jerky and irregular progress, clutch at objects in his way that would give him support. The observer who may be helping him to walk is soon aware that the patient is trying less to support himself than to sink to the ground, quite unlike the sincere efforts of the paraplegic whose disability is of organic origin. Hysterical helplessness in walking is all the more striking if, as may be the case, movements of the lower limbs are well carried out in bed.

Hysterical Sensory Disorders

Loss of sensibility in hysteria differs fundamentally from that due to organic causes. In the first place, it fails to conform to anatomical distributions—central, root, or peripheral. Thus, cutaneous analgesia in a limb tends to stop short at obvious landmarks such as the wrist, ankle, or knee. If it extends to the groin in front it is bounded behind by the fold of the buttock, and does not include the lower sacral areas. If the whole upper limb is analgesic the upper border encircles the shoulder-joint, a distribution which would be impossible in organic states. So also the front of the trunk may be insensitive while the back is intact. Secondly, the boundary of the analgesic area is sharply defined. Polyneuritis and subacute combined degeneration give rise to cutaneous sensory loss encircling the lower limbs or trunk, but the analgesic areas correspond to peripheral or segmental sensory distributions and their upper borders are never abrupt.

In organic states examples of sharp delimitation between regions of normal sensibility and sensory loss are few and are well explained on anatomical and physiological grounds. When, for example, there is analgesia over one half of the body, the line of demarcation between the areas of abnormal and normal sensibility is sharp. But should there, in addition, be absence of vibratory sense in the limbs and abdomen, on one side, a vibrating fork can still be appreciated by the chest, especially if it is placed near the sternum, since the chest is a sounding-box. In complete hysterical hemianaesthesia, however, appreciation of vibration may well be abolished on one half of the chest as well as cutaneous sensibility.

When there is complete loss of sensation below a level on one or both sides of the body, if the sensory loss is organic its upper border will have segmental or root characteristics, whereas in hysteria it will not. For example, the upper border of analgesia on the trunk, when organic, is never strictly transverse, but follows well-known wavy lines, whereas in hysteria it does not. Lastly, because of the budding out of the limbs, certain sensory root and segmental areas become contiguous with others from which they are separated by those which correspond to intervening roots or segments, so that the sensory overlap is absent. When this happens the borders of sensory loss are sharply defined. These regions of strict delimitation are especially between the outer and inner aspects of the upper arms, the anterior and posterior aspects of the thighs, and the sacral saddle-shaped areas in the buttocks ; on the trunk, a similar abrupt transition is found roughly at the level of the second ribs in front and the spines of scapulae behind, where the dermatome of the fourth cervical segment marches with that of the second thoracic.

A third characteristic of hysterical sensory loss is that it can be varied and abolished by suggestion. A fourth is that the inevitable, indirect consequences of organic sensory loss may be absent in hysteria. For example, ataxia of the lower limbs in polyneuritis, tabes, or Friedrich's ataxia is due to loss of postural sensibility from lesions of peripheral nerves, sensory roots, or posterior columns, and is naturally worse in the dark and if the patient's eyes are covered. In carrying out Romberg's test in the hysteric, however, the response obtained will, as has already been mentioned, depend upon whether or not he understands that his steadiness or some other function is under investigation. Hysterical loss of vision illustrates the same principle. Blindness may appear to be complete ; but, even so, the pupillary reactions to light are brisk, the fundi are clear, and the patient usually succeeds in avoiding objects when he attempts to walk about. Spiral fields of vision have long been known to indicate hysteria, and doubtless are the result of suggestion in performance of the test. Unilateral blindness and deafness may occur in association with complete hemianaesthesia. The psychogenic origin of the deafness as in cases of bilateral deafness can be recognized by evoking nystagmus by rotation of the body, and the blinking reflex by a sudden noise.

Fits

It is sometimes difficult, if an attack has not been observed by a competent witness, to decide whether a fit is epileptic or hysterical, especially if there is no history of injury during a fall, incontinence, or tongue-biting. All these features, which are common in epilepsy, may at the same time be absent. If the physician or a trained nurse has observed an attack it is usually easy to arrive at a correct diagnosis. The hysterical seizure is characteristically a dramatic performance with arching of the limbs and trunk, violent purposive movements, and often shouting and articulate speech. The patient may become cyanosed from holding his breath, but his eyelids are usually tightly shut and resist efforts to open them, and his pupils react normally to light. Furthermore, after the attacks the tendon-jerks and the plantar responses are invariably normal. Difficulties may, however, arise if the physician is unacquainted with less recognized forms of epileptiform attacks. Thus, in so-called tonic fits due to sudden disturbance of function of the upper part of the brain stem from organic lesions such as tumour or tuberculous meningitis, there is opisthotonos and the limbs are rigid, the lower in extension with pointing of the feet and toes and the upper flexed or extended ; but the eyes are open, the pupils are usually inactive to light, and incontinence may occur. Certain minor seizures, especially if unassociated with loss of consciousness, may present more difficulty. Thus in " myoclonus epilepsy " as the result of sudden muscular contraction the patient, although conscious, may fall down, or, if an upper limb is the part affected, an object held in the hand may be thrown across the room. So also in cases of " inhibition epilepsy," in which muscles of the limb are suddenly relaxed, falling may occur without apparent loss of consciousness. Again, involuntary clonic movements are often limited to a limb or one side of the face in Jacksonian attacks associated with focal cerebral lesions, but physical signs are to be found in the affected part at least for a time after the seizure. The necessity for routine examination of the optic disks is recognized but is not always applied.

Hysterical amnesias and fugues may occasionally be difficult to differentiate from automatism following petit mal attacks, but a careful history is usually decisive. Moreover, the hysteric in a fugue is not inclined to empty his bladder, as in the classical case of Trousseau's Judge, remove his clothes in public, or be homicidal ; in fact, his actions usually pass unnoticed. A chronic epileptic is often an emotional subject, and may show hysterical symptoms from time to time like other unstable persons. Nevertheless, there is little justification for the term " hystero-epilepsy."

This leads to the last point to which I would draw your attention. Emotionalism does not necessarily mean that the ill person has not some organic illness. It is perhaps equally unnecessary to say that states of anxiety may act as precipitating causes of physical disturbances, such as migraine, intracranial hypertension headaches, and occasionally epileptic attacks, as well as aggravating enfeeblement of organic origin. But it is less generally recognized that emotionalism may in turn be due to proven structural disease of the brain. Emotional facility, with an undue tendency to laugh or cry, is one of the commonest manifestations of disseminated sclerosis, a disease in which the transient character of the early disorders of function is apt to lead the unwary into making a wrong diagnosis.

All the more so if at the time of examination no physical signs are discovered. A similar emotionalism occurs also in pseudo-bulbar palsy, progressive bulbar palsy, chronic alcoholism, dementia paralytica, and occasionally with cerebral tumours, but by the time it appears, clear indications of structural damage can usually be found.

Lastly, the apathy of Parkinsonism, which is often more apparent than real, may be wrongly interpreted as psychogenic. But quite apart from the unmistakable physical abnormalities, even in early cases, which are now common knowledge, the lack of emotional reaction should in itself lead one to suspect its organic basis.

In conclusion, while the analysis of symptoms and signs is of the utmost value in the subject under discussion, the investigation of the behaviour of the individual as a whole in the past as well as in the present is the basis upon which diagnosis has often to rest. Let us not forget, too, that a neurotic may develop organic troubles like other people, and also that a person may become mentally unstable as the result of anxieties consequent upon physical disabilities. In this respect, minor head injuries ought especially to be remembered.

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BY

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The differential diagnosis between functional and organic nervous disease is obviously a wide subject. At the outset an exact definition is needed as to what constitutes functional nervous disease. Broadly, this may include all nervous manifestations in which no evidence of pathological changes in the nervous system has been demonstrated. Cases of dysfunction without demonstrable organic lesion may therefore be classed among the functional cases, and disturbances resulting from psychological stresses in the highest psychic level will also need to be included. The symptoms of the diseases commonly known as the neuroses or psychoneuroses will, of course, come under review, as will some of the psychoses. While some psychoses, such as general paralysis, have a very evident organic basis, others represent derangement of function, and little objective organic evidence may be obtainable.

The association of so-called functional elements with organic lesions raises an even wider issue. Cases in which no functional element was apparent before an organic lesion developed bring up the whole question as to the relation between these groups, and as to how far they can be justifiably separated. The attempt may be difficult, as may be judged from the fact that a leading neurologist stated, in discussing hysteria, that there were few organic symptoms which he had not seen reproduced in that disease. Functional disorder of the nervous system may disturb any bodily system and lead to confusion with diseases other than those of the nervous system, and separating the functional incapacity in a given lesion from that due to organic disease may be very difficult. In a short paper it is obviously impossible to deal with all aspects, but I shall endeavour to show the importance of examining the problem as a whole, and of not neglecting the psychological approach.

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Consideration of the person's whole make-up and circumstances often renders the diagnosis clear when individual symptoms may be very puzzling. Recognition of a hypochrondriacal attitude of mind is of great importance in the valuation of symptoms. This abnormal concentration on the individual's own body represents a psychological abnormality, whether it is present as a simple neurosis or whether associated with a depressive or paranoid psychosis.

Neurasthenia

As I am approaching the subject rather from the functional point of view, I shall first consider the different aspects of the neuroses. While hysteria and its subsidiary, the traumatic neurosis, perhaps provide the principal problem, neurasthenia and anxiety neurosis, and the various mixed types, also need consideration. By neurasthenia I mean the exhaustion neurosis, in which the patient shows marked mental and physical fatigability.

The individual is usually a limp, sparely nourished, unhealthy-looking person, unable to concentrate, finding all exertion, mental or physical, too great. If attempting to perform a physical act he rapidly tires, and he becomes increasingly inefficient when faced with a mental task. Special tests prove this to be a feature of a genuine case. Such a state of affairs exists to some extent after any great and debilitating illness, but the conditions persist in the neurasthenic long after the recuperation would have taken place in the normal individual.

The presence of anaemia, tuberculosis, or any chronic associated factor must of course be eliminated, and then arises the question of some chronic toxaemia. The teeth and intestines fall under suspicion, sometimes rightly, but at times drastic measures in regard to these are adopted without avail. Sometimes the case is one of incipient melancholia, the loss of interest and disinclination to exertion being a stage in the depressive phase of a cyclothymic or manic-depressive psychosis. What is at first regarded as a post-influenzal debility, and then as neurasthenia, may ultimately prove to be the early stage of a depressive psychosis. Usually, however, the associated depression, as opposed to a limp apathy, differentiates between them. Too much listless apathy and indifference to external circumstances would, on the other hand, arouse the fear that the case was really one of schizophrenia, but the pure neurasthenic is not given to fantasy, "day dreaming," and other features of the praecox case. Although the fatigability of the muscles in myasthenia gravis to some extent suggests neurasthenia, it is not common to confuse the condition. The facial muscles are usually quite mobile in neurasthenia, and there is no paralysis of groups of muscles such as the orbicularis palpebrarum or palatal muscles. The acute symptoms of encephalitis lethargica are hardly likely to be confused with neurasthenia. The dulling and immobility of mind of the encephalitic might be confused with a neurasthenic or depressive individual, but the mask-like rigidity and salivation so common in the former are quite uncharacteristic of the latter. The dull immobility of the praecox syndrome, possibly associated with salivation, is far more likely to be confused with the effects of the encephalitis lethargica, and confusion has at times arisen. The encephalitic, however inhibited, is more fully alert, given time to express himself, while the praecox is actually confused, and no amount of time allowed for expression will improve matters. The mannerisms and wrinkled forehead of the praecox are usually distinctly different from the mask-like face of the encephalitic. Mentally, variability and inconsequence, or perhaps stupor, will contrast with the slow, inhibited endeavour to find expression. This slow,

hesitant expression may perhaps resemble the retarded melancholic, whose furrowed facies contrasts with the encephalitic. Genuine acute depression is sometimes added to the encephalitic syndrome. A full recognition of the mental and physical wreckage that the disease has brought may cause the individual to feel that death is the only solution to his difficulty. Suicide is a real risk in such cases, which are sometimes very logical in their depression.

The older type of neurasthenic presents other problems. Such cases are not obviously of the type of which it has been said that their vitality has been squandered by their ancestors. In other words, the predisposing congenital element is less evident, and one seeks other causes. Real mental and physical strain may have preceded a collapse, and the toxins of alcohol, tobacco, etc., may have influenced them. When the stress reaches breaking-point quite a sudden collapse may occur in these cases. Eliminating the more obvious alcoholic syndromes, neurosyphilis should be remembered as a possible cause. A neurasthenic attack in the middle-aged should always be regarded with suspicion, particularly if the patient has not previously shown tendencies of this type, and signs of neurosyphilis should be looked for and the serological findings tested if there is doubt.

Anxiety States

The varied manifestations of the anxiety states perhaps provide more difficulties than other syndromes owing to the variety of the symptomatology, and also owing to the fact that the patient is obviously so sane and so genuinely affected by his symptoms. Fear and apprehension is the prevailing feeling of the individual, who is in a general state of excitation. Many symptoms suggest sympathetic stimulation. Some symptoms, however, suggest disturbance of the parasympathetic supplied through the vagus, and while the names vagotonia and sympatheticotonia have been applied to the different conditions, the symptoms are so frequently mixed in type that it is better merely to say that they represent functional disturbances of the autonomic nervous system.

Closely allied are the vasovagal attacks, in which the patient exhibits a sudden sense of oppression, usually starting with an epigastric sensation, followed by dyspnoea, and disordered action of the heart and even a sense of impending death. Similar symptoms are observed in the acute or paroxysmal phase of the anxiety syndrome, and when, as rarely happens, consciousness is lost, the condition may even suggest epilepsy. It is, however, much more likely to suggest some other cause for fainting, and may even be mistaken for some cardiac condition such as coronary thrombosis. The patient usually merely fears he is about to lose consciousness; he is in a state of acute fear and apprehension, and may fall over slowly, clutching at things as he falls, and making every effort to regain control. There is not the careful disposition and dramatic effect seen as in the true hysterical fit, the patient being genuinely distressed.

At times the condition may suggest a minor cerebral attack, as the patient may complain of a feeling of congestion in the head or say he feels as if his head were going to burst. The pulse is rapid, and may even seem inhibited, but irregularity apart from cardiac disease is, in my experience, not usual. Respiratory attacks, with a breathlessness resembling air-hunger, may also be a feature of the acute attack. A study of the interparoxysmal symptoms and of the psychological basis will help to make diagnosis clear. Where there is obvious sexual excitation without relief, faulty methods of contraception, leading perhaps both husband and wife to seek advice, or general causes likely to lead to anxiety, the nature of the case becomes clearer. The interparoxysmal symptoms, although more likely to resemble diseases of other systems, will help in elucidation. The disordered action of the heart with precordial pain, and no evident organic lesion, so commonly seen during the war, is a common symptom. Sweatings of the palms may occur, and this may be more generalized. The tremor, combined with the rapid cardiac action, may suggest exophthalmic goitre, with which the condition may, indeed, be associated. Symptoms of intestinal disorder have been referred to, such as eructation, vomiting, various results due to irregular peristaltic contractions, and diarrhoea, even with tenesmus—all symptoms of the fear syndrome, and aptly illustrating the well-known phrase, "Their bowels were turned to water."

In some cases the psychological basis may be less evident, and abnormal vagal stimulation on the lines of oculo- and gastro-cardiac reflexes appears to result from gastro-intestinal movements. At times abdominal manipulation will make the patient realize that the origin of the vague discomforts and sensations complained of lies in movements of the gut. Between the anxiety syndrome and the hysteric occurs anxiety hysteria, a definite neurosis, in which are classed those whose hysterical reaction mainly expresses itself in mental anxiety symptoms. Apart from this, mixed types occur in which it may be difficult clearly to separate the anxiety and hysterical symptoms.

Hysteria

The hysteric is the classical simulator of many diseases, but much time and trouble might be saved if more effort were made to study the patient as a whole, instead of concentrating upon individual symptoms. To deal with a hysteric much study of the patient's immediate and remote situation is necessary, but an accurate appreciation of the immediate situation will often enable a quicker and more accurate diagnosis to be made than if the approach had only been from the physical aspect.

Some hysterics are first seen in the psychological department of a general hospital, while others arrive there with a dossier from all the other departments, elusive symptoms having been followed from system to system. The family doctor is in a particularly favourable position to see and appreciate the family situation, which is the basis of the faulty reaction. At times, by judicious advice, he may alleviate the intolerable situation which is being shirked. Hysterical symptoms represent an idea of the patient tending to satisfy the subconscious purpose. The nature of the symptoms may be determined by the type of disability most useful to obtain that end, or in case of a traumatic neurosis by an original injury to that part. The lesion is usually a loss of function, but is associated with the general petulant emotional reaction of a hysteric. Such lesions may occur either on the psychological or on the physical plane. Among the former may be mentioned the amnesias, fugues, cases of double personality, and also the stupor, while the latter will show sensory and motor changes—that is, anaesthesia, hyperaesthesias, and, on the motor side, convulsions and palsies.

Dealing first with convulsions, a case of major epilepsy seen in a fit is probably the simplest problem. The hysteric seldom produces the different stages of the fit at all realistically, and still less the post-epileptic confusion and coma. A well-described true aura is also against a diagnosis of hysteria. In the post-epileptic state extensor plantar responses would negative hysteria but not epilepsy. To some extent the general mental make-up will help to differentiate the childish and probably dull and irritable epileptic from the petulant but quicker-witted hysteric. In some cases this will not help

particularly in the very difficult problem of the hysterical epileptic—that is, the epileptic with hysterical manifestations. Where obvious attacks of true major epilepsy alternate with equally obvious hysterical outbursts, little difficulty arises, although an observer who has only seen one or other group may be deceived. Rarely, epileptics can simulate genuine fits to an extent which can deceive, and I have known a hysterical epileptic have realistic "pseudo-fits" at a demonstration. It is usually, however, the combination of petit mal with hysterical manifestations which deceives, and until some indication of the epilepsy, such as unexplained bed-wetting, occurs, the real nature of the case may be missed, always remembering that even these symptoms have been counterfeited by hysterics. The many other causes of convulsions are more likely to be confused with epilepsy than with hysteria, but an unexpected fit without previous history may arouse suspicion as to a functional origin.

Some Causes of Convulsions

Among the other causes of convulsions may be mentioned conditions causing intracranial tension. Fast-growing tumours are unlikely to be confused, as the evident signs of pressure develop, but slow-growing tumours in which signs of pressure develop slowly may cause confusion. In a case in point of one of these slow-growing tumours, an oligodendroglioma produced the first fit, for which the patient was invalided from the Navy seventeen years before death.

Localization by mental symptoms is not reliable owing to the variability of these symptoms, which may occur even in subtentorial cases. Tumours of the frontal lobe, and perhaps of the corpus callosum, are, however, more apt to be associated with early mental symptoms than those in other areas, and deterioration and dementia may occur even before signs of pressure make the nature of the case obvious. At times such a dementia may be associated with dysarthria, causing general paralysis to be suspected in what is really a frontal tumour syndrome. Confusion and deterioration occur in cases of Picks's and Alzheimer's diseases, as well as in cases of cerebro-arteriosclerosis, where temporary confusion from a recent vascular lesion may be added to a permanent deterioration. In all the above cases convulsions may occur which need differentiating from epileptic or hysterical manifestations, and similar convulsions may occur with alcoholism, and certain cerebral poisons such as lead, mercury, etc. The convulsions due to metabolic disturbances must be remembered, such as uraemia, eclampsia, and hypoglycaemia, and, in childhood, disturbances associated with infection, rickets, and teething, which last may represent the earliest signs of epilepsy.

A further convulsion which may need differentiating from epilepsy or hysterical convulsions is the fit associated with tetany. In one case, a woman of about 30 years, who had had a partial thyroidectomy for exophthalmic goitre, developed fits of a tetany type, some of which developed into generalized convulsions. Her blood calcium was low, but improved to normal under treatment with calcium and parathyroid. Her fits became less and less suggestive of tetany, and more characteristic of genuine epilepsy.

Convulsions can also occur in disseminated sclerosis, but it is not in this way that the disease is usually confused with hysteria. It is in the early stages that the variable losses of power with remittent tendencies occur, which cause the diagnosis to be at times in doubt before evident signs of the organic lesion develop. The reaction of the disseminated case is at times not unlike that of the hysteric, and hysterical symptoms may even be added to those due to the organic disease. Generally, the paraplegia is more suddenly and dramatically complete in a hysteric, whereas other organic symptoms will be evident in the disseminated case, presenting a complete spastic paraplegia.

Motor and Sensory Disturbances in the Hysteric

Hysterical paralysis may affect any of the senses or limbs, or a combination of limbs. The lesions most commonly met with are probably paraplegia or monoplegia of an upper limb, and aphonia. The hysterical paraplegia leads to a complete incapacity, necessitating the care and eliciting the attention and pity that the hysteric desires. In the poorer classes it may lead to admission to a hospital, and so cause a removal from irksome home conditions. Signs of organic lesion will, of course, be absent, although disuse phenomena may occur later. Control of organic sphincters will usually be retained, although at times lack of control of these functions may occur which may be accompanied by neglect of person. Usually, however, apart from the lesion complained of, conduct will be excellent, and the individual will suffer as little inconvenience as possible, consistent with the lesion. Sensory loss may or may not accompany the paralysis, and when present may help with the diagnosis, owing to inconsistencies incompatible with an organic lesion. The underlying psychological idea of a paralysis may at times be traced, as in the case of a girl with a monoplegia of an upper limb which she had used to repulse her lover when he attempted liberties, the paralysis representing subconscious regret that she had so repulsed him. Usually the diagnosis is not difficult, the paralysis being limited to a movement or limb. When a movement is taking place, apparently with great difficulty, marked contraction of the antagonistic group of muscles will be evident, as well as contraction of the primary movers, which would not occur in a genuine paralysis. If rigidity is present investigation increases it, and endeavouring to overcome it provokes emotion from the patient. In gait, the tendency of a hysteric is to call attention to his lesion by dragging the limb, whereas the paralytic endeavours to compensate for his deficiency by circumduction. Similarly, tremors increase on observation and cease when attention is distracted to other parts.

The movements known as tics are commonly attributed to automatic or habit spasms, possibly associated with a local irritation or stimulus. At times, and in their early stages, they represent definite symbolic movements on the lines of a compulsion neurosis, the performance of which satisfies the unconscious wish whose emotional effect has been transferred to the symbolic act. The treatment of such cases is difficult, but tracing the tic to its origin, where this is possible, should release the pent-up affect attaching to such symbolic movements. Sensory loss without paralysis is much less usual in hysterical patients, although hyperaesthesia may be complained of as a means of eliciting sympathy. The hallucinatory disturbances of cutaneous and organic sensations seen in some of the psychoses are complained of in more general terms as burning or electrical sensations, and not as painful points or definite specified hyperaesthetic areas. Further, the depressed cyclothymic patient has a very different general reaction, and, although in certain phases the schizophrenic may resemble the hysteric, his reaction is essentially introverted, and he is unlikely to obtrude his symptoms.

Hyperaesthesia and other disturbances associated with dyspareunia due to some sexual incompatibility are important, as the whole group of symptoms is readily understood when the underlying attitude is revealed. Such symptoms mainly cause confusion with minor gynaecological conditions, and range from simple complaints of pain to elaborate hypochondriacal ideas with abnormal

paranoid trends. They include real cases of abnormal sexual incompatibility, ranging down to cases which have failed to adjust in regard to contraception, with fears of pregnancy, and menopausal cases, where one of the parties has ceased to desire sexual relations. An appreciation of this saves much investigation of elusive symptoms.

Coming to the special senses, blindness, deafness, and loss of speech may all occur. Elaborate tests to deceive the senses have been evolved to prove the functional nature of the cases. Unilateral blindness is perhaps more usual ; conjunctivitis is not uncommon, being easy to produce and resulting in a similar incapacity. Aphonia, where phonation is lost but articulation is preserved, is the common hysterical lesion, as the patient can still converse in a whisper, again suffering incapacity without great inconvenience. The partially adducted state of the vocal cords is characteristic. The adoption of face-saving methods in inducing speech by faradism facilitates cure of this symptom.

Mutism is more generally a sign of stupor, although it may occur in persons fully alert mentally, but silent owing to hysterical or delusional ideas. Among the common causes of stupor may be mentioned post-epileptic phenomena, depressed cyclothymic cases, hysterics and schizophrenics, and cases of so-called idiopathic stupor. Somnolent cases of encephalitis lethargica may resemble this state, and cases of pathological somnolence or narcolepsy, some of which may be associated with organic lesions, such as cerebral tumour. Among the rarer conditions may be mentioned such a phenomenon as cataplexy, a condition in which movement is impossible, although consciousness is retained. While some of such cases have a physiological basis, many on investigation will be found to be cases of hysteria.

Without an adequate history, differentiation between the conditions may be difficult. The principal difficulty is in separating the cases of hysteria from the praecox syndrome. The hysterical type, fully alert to her surroundings, who, under suggestion or other suitable conditions, passes into a hysterical trance, is usually obvious, but when extended periods of stupor, with few if any remissions, occur, with marked dissociation, the fear will be that the case is one of serious schizophrenic dissociation, even when mannerisms and other suggestive schizophrenic symptoms are absent.

In conclusion, I would again repeat that neglect of the psychological aspect leads to failures in diagnosis and treatment, owing to undue emphasis being placed on the individual symptoms. When both physical and mental aspects are considered, a true perspective is obtained, with beneficial results both to doctor and to patient.

With the July issue of the *Fortschritte auf dem Gebiete der Röntgenstrahlen* began the fiftieth volume of a monthly periodical which has rendered very great services to radiology the world over. Founded in 1897 by Heinrich Albers-Schönberg, who was himself a radiological pioneer, it has given publicity to many of the outstanding discoveries in connexion with *x* rays, and been a foster father to various of the subsequent journals which dealt with the more specific applications of this subject as they came into being. It has been adopted as the official organ of radiological societies in Czechoslovakia, Austria, Hungary, and Russia, as well as in Germany, and has won universal recognition as a sound and reliable as well as a progressive periodical. It is only right that the July issue should begin with the first Albers-Schönberg memorial lecture, which was delivered at the congress of the German Radiological Society in Baden-Baden last April. The present editor is Professor Rudolf Grashey-Köln.

MECHANICAL TRANSMISSION OF TRYPANOSOMIASIS, LEISHMANIASIS, AND YAWS THROUGH THE AGENCY OF NON-BITING HAEMATOPHAGOUS FLIES

(PRELIMINARY NOTE ON EXPERIMENTS)

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In this preliminary communication it is not intended to review and discuss fully the immense literature on experimental and field observations regarding the direct transmission of trypanosomes, leishmania, and other blood-inhabiting organisms. It is proposed, however, to emphasize the important part which may be played by non-biting haematophagous flies in the mechanical dissemination of blood-inhabiting organisms, which appears hitherto to have been largely overlooked.

Most authorities are in agreement that, apart from cyclical transmission through the agency of tsetse flies, direct methods of infection by *Tabanidae*, *Stomoxys*, and other biting flies play an important part in the active spread of trypanosomiases. Thus Duke (1919, 1921, 1923) believes that the sleeping sickness epidemics which sweep over certain parts of Africa are due to mechanical infection from man to man by tsetse flies ; and Hornby (1921) states that the direct spread of trypanosomes among domestic stock is by no means uncommon as the result of the introduction of an infected animal into a clean herd living in a tsetse-free area. Wenyon (1926), in summing up the evidence on mechanical transmission, says it has been clearly demonstrated that a purely mechanical infection may occur by a biting fly contaminating the wound it inflicts with infective blood which it has recently taken into its proboscis from another host.

Earlier Observations on Fly Transmission

In proportion, however, to the amount of research that has been undertaken on direct transmission, the positive experimental evidence that has been brought forward incriminating these biting flies is so meagre as to suggest that the mechanism of this method of transmission is not fully understood. It was concluded so recently as 1933, at the conference at Entebbe on the tsetse and trypanosomiasis, that further information based on experimental work was necessary to elucidate the problem of mechanical transmission.

Work on the transmission of the tissue-inhabiting pathogenic protozoa by Diptera other than the biting species, *M. domestica* in particular, is on record, though the observations are scanty. Castellani (1907) fed *M. domestica* and allied species of flies on scrapings from yaws which contained *Treponema pertenue*, and afterwards, by transferring them to scarified sores on monkeys, produced an infection in one of the experimental animals. The flies were kept in position on the sores of the monkeys for two hours. Darling (1913) reported mechanical transmission of *T. evansi* (*T. hippicum*) to animals through the agency of house-flies which infested the open sores on mules in Panama. Laveran (1880) first suggested that oriental sore in Biskra might be due to transference of infection by flies, and Wenyon (1926) stated that it was highly probable that the house-fly, which swarms round

exposed oriental sores, especially in children, might sometimes carry the causative organism on its feet or proboscis to abrasions on the skin of another person. The same observer thought that leishmania bodies might pass rapidly through the gut of the fly and so be deposited with the dejecta.

Observations relating to non-biting haematophagous flies appear to be very few, probably from the fact that most observers have failed to distinguish the various species from *M. domestica*. It is apparent, however, from a study of their life-history and habits, that they are far more likely to be agents in the dissemination of blood-inhabiting protozoa than *M. domestica*. Patton recognized that the wounds produced by biting flies might be infected subsequently through the agency of non-biting blood-drinking muscids. His observations related to an Indian species named by Austen (1910) *M. pattoni*. Patton and Cragg also give a chapter on the haematophagous flies in their classical textbook, and emphasize their character and habits.

The Non-biting Muscid in Nyasa

In Nyasaland various species of these muscids abound, one in particular—*Musca spectanda* Wied—being, as recent work by W. A. Lamborn has shown, almost entirely dependent throughout its whole life on man. The eggs are laid solely on human excreta, on which the larvae feed to maturity. The adult flies, often in large numbers, especially in the early morning, settle on man, awaiting the opportunity to slake their thirst and deposit their eggs on his freshly excreted faeces. Swarms of non-biting haematophagous flies, including *M. spectanda*, may be found infesting abrasions and sores on domestic animals. They drink greedily the blood which oozes from the bites of *Tabanus*, *Stomoxys*, and other biting flies, and actually hustle them off in order to secure a meal. *M. spectanda* appears to be almost unique in the way in which it concentrates on man. It attacks persistently and with great determination scratches, wounds, open sores, tropical ulcers, yaw nodules, etc., and greedily drinks to repletion blood, serum, or secretions from the nose, eyes, or mouth. In one instance thirty-five *M. spectanda*, all females, were captured in three-quarters of an hour from a linear scab half an inch long on the dorsum of the foot of a native, when, despite the abundance of *M. domestica* in the neighbourhood, not a single specimen was included in the catch. Catches of fifty to sixty *M. spectanda* can be made readily within an hour in the early morning from the shoulders of any native.

These observations by Lamborn, and the hypothesis put forward by him (1932) concerning the part muscids may play in the spread, not only of trypanosomiases, but also of cutaneous leishmaniases, led to the experimental work described below, for which the senior author was largely responsible. As will be noted, the most important fact that has emerged is that this group of flies is capable of taking up and actively depositing blood-inhabiting protozoa and spirochaetes, either by regurgitating them from the proboscis or by passing them unchanged and alive in the excreta over a period of five to six hours.

Mechanical Transmission of *Trypanosoma brucei* through the Agency of *Musca spectanda*

In these experiments over 200 flies, both bred and wild, were used. The usual procedure was to feed them on blood exuding from a puncture of the ear of a dog or from the tail of a rat infected with *T. brucei*. A certain proportion of flies thus fed commenced in about five minutes to pass in their dejecta either pure blood or blood-stained fluid full of actively motile trypanosomes, while some flies continued to pass, at intervals, living trypanosomes for a period of at least six hours after an infective feed. A smaller proportion of flies were seen to blow a blob of blood containing living trypanosomes from their proboscis five or ten minutes after a feed.

Blood-stained excreta and regurgitation of blood were observed not only in the case of the flies fed on infected blood but in those fed on the normal blood of man and domestic animals and on other fluid material. The blood-passing capacity of various batches varied to a very marked degree. This variation may be associated possibly with the food requirements necessary for the maturation of the ova in the female.

Thus in one experiment twelve flies were fed on a dog infected with *T. brucei*, and although numerous drops of clear excreta were passed over a period of five hours in no instance was either blood or trypanosomes detected. This batch of flies was killed after five hours, and motile trypanosomes were seen in the gut of eight of them.

In another experiment seven out of twelve of the flies fed on a dog infected with *T. brucei* commenced to pass drops of blood-stained excreta in from five to ten minutes, and continued to excrete numerous drops for five hours. All these drops contained active trypanosomes. One fly also regurgitated a drop of blood from its proboscis full of active trypanosomes.

Over a period of five hours one fly passed forty-one drops of dejecta, another seventeen drops, and a third fifty-three drops, all of which were blood-stained and contained living trypanosomes. As an example of the extraordinary capacity of this muscid to deposit living trypanosomes in its excreta it may be stated that a batch of ten, fed to repletion on the blood of a dog infected with *T. brucei*, passed in six hours 265 droplets stained with blood and containing living trypanosomes.

In carrying out experimental infections flies, after a feed on *T. brucei*, were placed in specimen tubes covered with gauze, and the drops of excreta containing living trypanosomes passed on to the sides of the tube were drawn up into a capillary in saline or citrate solution.

Into one rat excreta containing trypanosomes was introduced intraperitoneally, infection duly taking place. A second rat was successfully infected by placing a drop of excreta on a small fresh cut on the ear, and a third rat developed an infection with *T. brucei* after a drop of the fly's excreta had been placed on a drop of blood exuding from a fresh puncture made by a tabanid, *T. fraternus* Ric.

From the experimental observations here recorded there cannot be any doubt that, apart from any mechanical transmission by the action of biting flies *per se*, the combined action of these and the non-biting blood-drinking species is capable of bringing about the transmission of trypanosomes under natural conditions. The presence of hordes of these flies, which persistently infest and annoy both man and other animals—especially when abrasions or sores are present—is a significant fact when it is realized that their capacity for distributing viable trypanosomes is so perfect. Their predilection for the mucous surfaces, moreover, suggests a means whereby infection with trypanosomes may take place. Experimental work to test the possibility of infecting rats through the eye, nose, and mouth by the excreta of these flies containing *T. brucei* was, however, unsuccessful.

Passage of Living Leptomonads of the Cultural Forms of *Leishmania donovani*, *L. infantum*, and *L. tropica* through the Intestine of *Musca spectanda*

Observations on visceral leishmaniasis indicate that this form of the disease has the same geographical distribution as sandflies of the *major* group—*Phlebotomus argentipes* in India, *P. chinensis* in China, *P. perniciosus* in Italy,

Malta, and Algeria, and *P. major* in Greece. Cutaneous leishmaniasis, on the other hand, occurs where *P. papatasii, P. sergenti,* or *P. caucasicus* are found.

The problem of the relationship of these flies to the transmission of leishmaniasis has been ably reviewed by Wenyon, and more recently by Adler, and it would appear that the entire mechanism of transmission through their agency requires further elucidation. It is a curious fact that out of numerous attempts to transmit leishmania through the bites of infected sandflies very few positive results have been obtained. Shortt, Swaminath, and Krishnan recorded one successful transmission of *L. donovani* to a Chinese hamster through the bites of sandflies, and more recently Napier, Smith, and Krishnan report further successes. The numerous negative results in transmission through the bites of these flies is not easily explained when it is considered that the Chinese hamster is a very susceptible animal. Napier, Smith, and Krishnan (1933) have shown that both the rounded tissue forms and the flagellate forms of *L. donovani* can produce infection in hamsters when introduced intraperitoneally, subcutaneously, percutaneously, orally, and conjunctivally. A very high proportion of infections was produced by both forms of the parasite by all the routes tested, and it was further shown that except by the conjunctival route the flagellate form was always the more infective.

It would seem that, apart from infection through the agency of sandflies, direct or mechanical transmission by non-biting haematophagous flies of both visceral and cutaneous leishmaniasis is possible. Considering the capacity of these flies for taking up blood or tissue parasites, it is difficult to conceive of a more ideal method whereby all species of leishmania can be distributed to abrasions or to the conjunctiva, mouth, or nose, especially as this group of muscids is so well represented in the countries where leishmaniasis is endemic. Oriental sores during ulceration can be a source of infection to the flies, and in kala-azar of man and the dog involvement of the cutaneous tissues allows haematophagous flies easy access to the leishmania bodies. Moreover, as it has been shown that viable leishmania occur in the faeces of man, it is quite possible that the flies could ingest them and pass them on as a result of the habits already described.

Experimental Observations.—In our opinion the following experiments point definitely to the fact that all the species of leishmania in man could be transmitted directly to healthy individuals by these flies, either through skin abrasions, or through the mouth or conjunctiva.

Cultures of *L. donovani* (three different strains) of Indian origin and cultures of *L. tropica* and *L. infantum* (dog strain) were obtained from the London School of Hygiene and Tropical Medicine and maintained in Nyasaland. About 250 *M. spectanda* were fed in groups on these cultures, almost invariably to repletion, and, as in the experiments with *T. brucei,* many of the flies passed living leptomonads of all three species in their excreta from five minutes up to a period of three hours afterwards. One insect, fed on a culture of *L. donovani,* passed, during a period of three hours, twenty-three droplets of excreta containing living flagellates, and during the first five minutes after feeding regurgitated from its proboscis a drop containing them alive. A second fly, fed on the culture of *L. tropica,* passed in the same time thirty-one drops, all containing active flagellates, and a third, fed on a culture of *L. infantum,* passed eleven drops containing living leptomonads, also within the same time.

Unfortunately, owing to the fact that it was impossible to obtain the rounded tissue forms of the various species of leishmania, experimental work to ascertain the viability of these in the fly was not carried out, but from the work on the viability of trypanosomes and the flagellate forms of leishmania, it would seem to be practically certain that these tissue forms would be readily passed viable in the dejecta of the flies over a period of several hours. It is hoped that an early opportunity may be made available to test this important point, as it is possible that during their sojourn in the gut of the fly some, at least, of the tissue forms may make an attempt to flagellate, especially if retained for several hours.

Passage of Living *Treponema pertenue* through the Gut of *M. spectanda*

In these experiments three cases of yaws were used, and about eighty flies, all of which were bred.

Before feeding the flies on the yaws sore, the presence of the causative organism was determined by dark-ground illumination and by staining. Two of the cases had spirochaetes numerous enough for easy detection after passage through the flies. The sores were then cleaned thoroughly to get rid of any surface pus, and the flies were allowed to feed on the exuding fluid. They did so greedily, and again a certain percentage commenced to pass fluid, which was found to contain living *T. pertenue*. In this experimental work the spirochaetes were only detected up to a period of one hour after a feed. Lack of time prevented a fuller determination of the period they will remain viable in the excreta of the flies.

Flies could infect any breach of the surface of the skin either through their dejecta or by regurgitation, as already indicated in the previous paragraphs. In this connexion it is significant that primary yaw sores have been recorded as arising not infrequently on such sites.

Summary

1. Non-biting haematophagous muscids feed readily to repletion on blood, serum, serous exudate, ulcers, sores, and also secretions from the nose, eyes, and mouth. After a meal a certain proportion of these flies pass blood or serum in their numerous dejecta, which may contain large numbers of living trypanosomes, leishmania, or the *Treponema pertenue* of yaws.

2. These haematophagous flies have their preferred hosts—for example, *Musca spectanda* Wied, which occurs in great abundance in Nyasaland, favours man. It lays its eggs exclusively in human faeces, breeding very freely; it derives moisture from human faeces, and could thus take up *L. donovani* from this source, since the organism is known to occur sometimes in this medium. Large numbers attack persistently and with determination scratches, cuts, and sores of the skin of man in search of food, and also haunt the eyes, nose, and mouth in search of fluid.

3. *Trypanosoma brucei* in the blood of rats and dogs are readily ingested by *M. spectanda,* and during a period varying between five minutes and six hours these flagellates can be passed alive in the numerous droplets of dejecta passed through the gut of the fly. Rats were experimentally infected by the intraperitoneal injection of these dejecta by placing a drop on a fresh cut on the ear and by placing the dejecta on a drop of blood exuding from the bite of a tabanid. *T. brucei* in the dejecta introduced into the eye, nose, and mouth did not produce infection. Certain flies after a feed extrude a drop of the ingested blood containing living trypanosomes from their proboscis five to ten minutes after a full meal.

4. Living leptomonads in cultures of *L. donovani, L. infantum* (dog strain), and *L. tropica* are freely ingested by *M. spectanda,* and are passed viable in the droplets of excreta for several hours after a feed. There can be no doubt that these flies could ingest the round tissue forms of all the human forms of leishmaniasis and pass them in a viable state either through the gut or by regurgitation from the proboscis to sores or mucous membranes. It would seem certain that both kala-azar and oriental sore could be actively transmitted through the agency of these flies.

5. *Treponema pertenue* of yaws passes rapidly in a viable form through the gut of *M. spectanda,* and so could easily be deposited on cuts and abrasions.

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THE POST-OPERATIVE COMPLICATIONS AND RESULTS OF TONSIL AND ADENOID OPERATIONS IN CHILDREN *

BY

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This clinical investigation into the post-operative complications and results of tonsil and adenoid operations on children under 14 years of age was suggested by Dr. J. S. Fraser, surgeon, ear, nose, and throat department of the Royal Infirmary, Edinburgh.

Source of Material

1. *Hospital Patients* (1,457 cases).—These cases were operated on as out-patients in the three years 1927–9 inclusive in Dr. J. S. Fraser's department. Out of the 1,457 hospital out-patients 1,138 reported at the Royal Infirmary, and 315 were visited at their homes by the hospital social service. The post-operative complications were considered in all the cases, but only in 1,138 of them were the operation results noted.

2. *Private Practice* (900 cases).—These patients were operated on in private by Dr. J. S. Fraser and Dr. W. T. Gardiner during the ten-year period 1919–28.

The following points were ascertained from the parents of each out-patient who reported, and by means of a questionary sent to each private patient's doctor: (*a*) occurrence of any post-operative complications; (*b*) disappearance of the preoperative symptoms; and (*c*) condition of the general health since operation.

The following routine is adopted in Dr. J. S. Fraser's department as regards the out-patient operations on children under 14 years of age. Only those who live within a radius of three miles from the Infirmary are operated on as out-patients. Exceptions are admitted as in-patients—namely, (*a*) very delicate children, or children with some complication requiring observation (for example, acute suppurative otitis media), and (*b*) patients living in overcrowded or unsuitable houses. The parent is given full written instructions as to the preoperative preparation and post-operative care of the patient. The clinical assistants give the anaesthetics and do the operations (tonsil guillotine enucleation and removal of adenoids by curettes) under the supervision of the clinical tutor. When the haemorrhage has ceased the patients are put to bed in a ward for three or four hours after the operation. A clinical assistant examines each patient's throat before the parents take the child home in a taxi.

* Read in opening a discussion in the Section of Oto-rhino-laryngology at the Annual Meeting of the British Medical Association, Bournemouth, 1934.

Statistics

Preoperative examination of 1,138 hospital cases gave the following results:

Enlarged tonsils and adenoids	1,109	cases
Enlarged tonsils, no adenoids	10	,,
Adenoids only (tonsils previously removed)	19	,,
	1,138	

There was a previous history of a peritonsillar abscess in three cases, and a fourth patient presented himself for operation, but owing to the existence of a peritonsillar abscess his tonsil was not removed.

Operations in the 1,138 hospital and in the 900 private cases were as follows:

	Hospital	Private
Tonsils and adenoids removed... ...	1,089	825
Tonsils only	10	0
Adenoids only	39	75
	1,138	900

Results of tonsil and adenoid operations in the private and hospital cases:

Tonsils	Hospital per cent.	Private per cent.
Complete enucleation	80.3	97.0
Incomplete enucleation	19.0	3.0
Results unascertained (refused examination)	0.7	—

Complete enucleation of one tonsil with the guillotine and dissection of the other was done in eleven of the private cases.

Adenoids	Hospital per cent.	Private per cent.
Complete removal	81.8	99.5
Adenoids remains	17.5	0.5
Results unascertained (refused examination)	0.7	—

The above percentages of incomplete tonsil and adenoid operations are somewhat high in the hospital cases, but these operations were done and the anaesthetics given by thirty-three successive clinical assistants.

Post-operative Complications

The material reviewed below comprises 1,457 hospital and 900 private patients.

HAEMORRHAGE

In all cases, to safeguard against avoidable haemorrhage, a careful inquiry was made as to any tendency to haemorrhage—for example, from an ordinary wound or tooth extraction. If the patient was known to be a haemophiliac the coagulation index of the blood was ascertained and appropriate preoperative treatment adopted. In the groups of hospital and private patients under consideration there was no case of congenital haemophilia.

Attention to some points in the preoperative preparation and immediate post-operative treatment of the patients is productive of quick haemostasis. They are: (1) preliminary injection of atropine sulphate, (2) short ethyl chloride anaesthesia, (3) the use of a blunt tonsil guillotine and sharp adenoid curette, and (4) immediate post-operative treatment: this consists of sponging the face and neck with ice-cold water, and the adoption of the sitting position when the patient has recovered from the anaesthetic.

It should be noted that the age of the children is important, as under 14 years severe haemorrhage occurs less frequently than in older children.

Reactionary Haemorrhage.—Out of 1,457 hospital cases sixteen (slightly over 1 per cent.) had some reactionary

haemorrhage; this was slight in fifteen patients, but severe in one. In all cases the haemorrhage stopped spontaneously. Out of 900 private patients reactionary haemorrhage occurred in ten cases (1.1 per cent.). This was slight in eight (one from adenoids only) and severe in two, requiring special treatment to arrest it.

Secondary Haemorrhage.—In the hospital series fourteen cases (1 per cent.) of secondary haemorrhage were reported. This was slight in eleven cases and severe in three. Two of the latter were admitted to the Royal Infirmary, and one of them required special treatment to arrest the haemorrhage. The onset of the haemorrhage occurred on or between the second and seventh days after the operation. This is important, as hospital in-patient tonsil and adenoid cases are usually detained in hospital for only forty-eight hours. In the private series secondary haemorrhage was slight in one case (0.1 per cent.).

Thus we see that while in the private patients two cases of severe reactionary haemorrhage occurred, in the hospital there were three cases of severe secondary haemorrhage. No case of collapse or shock occurred from haemorrhage. The tendency to bleed shown in the above thirty hospital cases could not be credited entirely to partial removal of tonsils and adenoids, for later examination showed that in eighteen cases the operation was complete, while in only five cases were the tonsils incompletely enucleated and in seven there was still some adenoid tissue present.

Aural Symptoms and Complications

Earache.—Fifty hospital patients (3.4 per cent.) and twenty-five private patients (2.8 per cent.) complained of post-operative bilateral earache. The earache was probably a reflex otalgia from the operation area, via the glosso-pharyngeal nerve. Analysis of the preoperative histories of these cases showed that six of the private patients had preoperative pathological aural conditions predisposing them to attacks of earache—for example, one had scars in the tympanic membranes, four had previously had acute suppurative otitis media, and one had had a left Schwartze operation. In addition, two had previously suffered from earache.

Acute suppurative otitis media occurred shortly after operation in one private patient (0.1 per cent.), as compared with twenty-two hospital patients (1.5 per cent.); in half of them it was unilateral, in half bilateral. In the preoperative histories of these twenty-two patients the following factors had predisposed to an acute otitis media. Ten cases had complained of frequent colds, two of earache, and twelve of deafness. Of the latter, four had catarrhal otitis media and one had scars in the tympanic membranes. In the post-operative examinations another factor was revealed as influencing the incidence of otitis media after operation—namely, the incomplete character of the operation. In six cases the tonsils were enucleated incompletely, and in nine cases remains of adenoids were still present. The end-result in fifteen of the nineteen cases examined was cessation of the otorrhoea within fourteen to twenty-two days. Three cases went on to chronic suppurative otitis media, and one case had recurring attacks of acute suppurative otitis media. On examination, it was found that the perforations in the tympanic membranes had healed in fifteen cases, and persisted in four cases in the following positions: two central, one anterior, and one posterior.

Septic Throat

In the hospital patients there were four cases (0.22 per cent.) of septic inflammation of the throat with pyrexia and local inflammatory changes on the tonsillar fossae. No similar condition occurred in the private patients.

Nasal Catarrh

There were twenty-six hospital cases (1.8 per cent.) in which nasal catarrh supervened on the operation. In twenty-five of these it lasted only four days, but in the remaining case it developed into a chronic nasal catarrh lasting for a few months; five months after operation there was no macroscopic pathology in the nose, and an *x*-ray film of the nasal accessory sinuses showed no comparative obscurity; the patient had recovered. There was post-operative nasal catarrh in only two (0.2 per cent.) of the private patients. These children had previously complained of frequent colds, mouth-breathing, and deafness. In both cases the ultimate result of the operation was satisfactory, and all the preoperative symptoms were cured.

Paresis of Soft Palate

In the hospital series there were eight cases (0.5 per cent.) of paresis of the soft palate. All complained of difficulty in swallowing and of fluids regurgitating through the nose; six of them were very ill and feverish. All cleared up spontaneously within seven or eight days. The soft palate was injured in one private case (0.1 per cent.) at operation. Recovery was slow, but the symptoms gradually disappeared.

Torticollis

There were five hospital cases (0.35 per cent.) of torticollis. All recovered; four were well in three days, but one patient had a stiff neck for three weeks, which eventually cleared up with special treatment. No private patient suffered from this symptom.

Chest Symptoms and Complications

Cough, lasting for a few days after operation, without pain, sputum, physical signs, or constitutional disturbance, occurred in twenty-six hospital patients (1.8 per cent.). No pulmonary complications occurred in the private cases. There were five cases of pulmonary disease among the hospital patients (0.35 per cent.). All recovered, the bronchopneumonia within six weeks, and the other cases within three weeks. The operation had been done completely in all. These cases are briefly summarized below.

Pneumonia: Case 1.—Female, aged 5 years, following operation on 12/1/28 developed a right upper lobar pneumonia: recovery complete. Case 2.—Female, aged 9 years, after operation on 9/11/29 developed pneumonia: recovery.

Bronchopneumonia: Case 3.—Bronchopneumonia occurred in a male aged 8 years; operation on 4/7/29: recovery.

Pleurisy: Cases 4 and 5.—Two cases of pleurisy (one aged 8 and the other 10 years) occurred following operation on 25/6/27 and 29/8/29 respectively: recovery.

Septic Rash

Septic rash occurred in one case (0.07 per cent.). Previous to operation this patient had a follicular tonsillitis, so that a good deal of infection was present. The septic rash appeared four days after the operation, and disappeared after a purgative was administered. No case of septic rash occurred in the private patients.

Septicaemia, Toxaemia, and Pyrexia

There was one hospital case of septicaemia after operation. He made a good recovery within three weeks. No case of septicaemia occurred in the private patients.

Toxaemia, due to toxic absorption from the operation areas, occurred in two private cases (0.2 per cent.). Both patients were in a nursing home for four days, and had a rise in temperature for some days after returning home.

Pyrexia, due to persisting preoperative cervical adenitis, occurred in two private cases (0.2 per cent.). Operation

was done while the glands in the neck were inflamed, and fever persisted for two to five days after operation. No similar case was noted in the hospital patients.

ACUTE APPENDICITIS

There was one hospital case (0.07 per cent.) of acute appendicitis with general peritonitis. The patient was feverish for two days and remained in bed for four days after the tonsil operation. Exactly three weeks after the operation she was admitted to the Royal Infirmary and operated on for acute appendicitis with general peritonitis: no concretions were present. She made a good recovery. Acute appendicitis developed in one private case (0.1 per cent.): the patient recovered.

MENINGITIS

One case of meningitis was reported (0.07 per cent.). This patient died in the Sick Children's Hospital fourteen days after the tonsils and adenoids had been removed. The patient had been born prematurely, and was a delicate child. Pathological report on the tonsils: "No tuberculous infection." No similar case occurred in the private patients.

ACUTE OSTEOMYELITIS

Acute osteomyelitis of the femur occurred in one private patient (0.1 per cent.). After operation by a general surgeon the trouble eventually cleared up. No similar case occurred in the hospital patients.

EXANTHEMATA

Scarlet Fever.—Seven hospital patients (0.47 per cent.) developed scarlet fever within five days after operation, so that the infection may have occurred just prior to the operation. It is more probable, however, that they were cases of surgical scarlet fever. Two of these patients had complications: one had acute nephritis and the other purulent rhinitis: both recovered satisfactorily. One private patient (0.1 per cent.) developed scarlet fever after removal of adenoids: the patient recovered.

Pertussis.—One hospital patient, immediately after her operation, developed whooping-cough; this she must have been incubating.

Diphtheria.—In hospital patients two cases of diphtheria after operation were reported to the social service worker. The patients recovered.

There were thus ten cases of infectious fever in the hospital cases (0.68 per cent.), as compared with one (0.1 per cent.) in the private patients.

GENERAL DEBILITY

There were four hospital cases of general debility after operation. They all made good recoveries within seven to fourteen days. No similar case occurred in the private patients.

STATUS LYMPHATICUS AND DEATH UNDER ANAESTHETIC

There was one case of this. A male patient, aged 7 years, was anaesthetized with ethyl chloride, administered by the closed method with a Guy's ethyl chloride inhaler. As the left tonsil was being guillotined the patient stopped breathing; the tonsil was removed, the mouth gag was closed, and the child breathed again. The right tonsil was now removed, and again the patient stopped breathing. Respiration, however, did not return. The adenoids were not touched. All the ordinary methods of resuscitation were resorted to, but without success. At the post-mortem the appearances were those of a case of status lymphaticus. Beyond the great hyperplasia of lymphoid tissue found throughout the body there was nothing which would indicate any cause of sudden death. The thymus gland was enlarged, and weighed 43 grams. (The approximate weight of the normal thymus between the ages of 5 and 10 years is 23 grams.) In the preoperative history of this patient there was nothing to suggest a lymphatic diathesis, and consequently his enlarged thymus was not investigated clinically before operation.

The following table shows the incidence of the post-operative complications in the two groups of cases—hospital and private patients. For comparison, J. A. Keen's figures for 9,344 cases (1921–30) are given in the last column.

	Hospital (1,457)	Private (900)	Keen's (9,344) Cases
Haemorrhage:			
Reactionary	16 (1.0) per cent.	10 (1.1) per cent.	110 (1.2) per cent.
Secondary	14 (1.0) ,,	1 (0.1) ,,	58 (0.6) ,,
Aural complications:			
Earache	50 (3.4) ,,	25 (2.8) ,,	— —
Acute suppurative otitis media	22 (1.5) ,,	1 (0.1) ,,	60 (0.6) ,,
Mastoid abscess and intracranial infection	— —	— —	6 (0.05) ,,
Septic throat	4 (0.22) ,,	— —	— —
Nasal catarrh	26 (1.8) ,,	2 (0.2) ,,	— —
Paresis of the soft palate	8 (0.5) ,,	1 (0.1) ,,	— —
Torticollis or stiff neck	5 (0.35) ,,	— —	— —
Cough	26 (1.8) ,,	— —	*
Pneumonia	2 (0.13) ,,	— —	13 (0.14) ,,
Bronchopneumonia	1 (0.07) ,,	— —	5 (0.05) ,,
Pleurisy	2 (0.13) ,,	— —	— —
Septic rash	1 (0.07) ,,	— —	— —
Septicaemia	1 (0.07) ,,	— —	5 (0.05) ,,
Toxaemia	— —	2 (0.2) ,,	1 in 20 or 30
Cervical adenitis	— —	2 (0.2) ,,	5 (0.05) ,,
Acute appendicitis	1 (0.07) ,,	1 (0.1) ,,	— —
Meningitis	1 (0.07) ,,	— —	— —
Acute osteomyelitis	— —	1 (0.1) ,,	— —
Scarlet fever	7 (0.47) ,,	1 (0.1) ,,	18 (0.18) ,,
Whooping-cough	1 (0.07) ,,	— —	1 (0.01) ,,
Diphtheria	2 (0.13) ,,	— —	3 (0.03) ,,
General debility	4 (0.27) ,,	— —	— —
Status lymphaticus	1 (0.07) ,,	— —	— —
	13.02 per cent.	5.3 per cent.	

* Keen gives the figure 5 (0.05 per cent.) under the heading "bronchitis."

Physical Examination following Operation

The material reviewed below comprises 1,138 hospital out-patient cases. Where information is available the results in the 900 private patients are also given.

FAUCIAL PILLARS AND SOFT PALATE

The pillars of the fauces showed scarring in 753 cases, and one or both pillars had been removed altogether in a few instances. The palate was scarred and drawn tightly across the fauces in three cases. The uvula had been removed in seven cases.

LYMPHOID TISSUE IN OROPHARYNX

Granular pharyngitis with distinct lymphoid nodules on the posterior pharyngeal wall was present in 463 cases; these patients had no subjective symptoms. Before operation the condition was noted as being present in only forty-seven cases. The lymphatic tissue in the lateral pharyngeal bands was hypertrophied in 473 cases: in one case there was a follicular lateral pharyngitis. Previous to operation the lateral pharyngeal bands were noted as

enlarged in only two cases. The lingual tonsil was enlarged in six cases ; in one of these the lingual tonsil was enormously hypertrophied. Post-operative examination was carried out in each case at periods varying from some months up to three years after the tonsil and adenoid operation. The whole picture showed the tendency to compensatory hypertrophy of lymphoid tissue in the oropharynx, and suggested that the presence of lymphoid tissue is necessary for the well-being of these young patients. (Digby considers that lymphoid tissue plays a large part in the production of acquired immunity.)

CERVICAL ADENITIS

In the hospital patients the tonsillar lymph glands were found to be enlarged before operation in 526 cases (on both sides in 507 and in the remaining nineteen cases on one side only). At the post-operative examination, carried out in each case at periods varying from some months up to three years after the tonsil and adenoid operation, the glands were still enlarged in 53 cases, markedly so on both sides of the neck in two cases, and on one side of the neck in four cases. Excision of the enlarged cervical glands was carried out in two cases. The tonsils were examined histologically in thirty-one of the 526 cases, but tuberculous follicles were found in only five cases. In the private patients prior to operation eleven had cervical adenitis, one of whom had discharging sinuses in the neck following incision. After operation the infected sinuses in this case continued to suppurate. The enlarged glands in the neck subsided in three cases and persisted in seven cases after operation.

STATE OF TYMPANIC MEMBRANES

In the hospital patients the tympanic membranes presented the following characteristics on examination made, in some cases, a few months, in others one, two, or three years after the operation.

	Right	Left
Normal tympanic membranes ...	46	44
Retracted tympanic membranes ...	1,032	1,036
Perforated drumheads	44	42
Ears not examined	16	16
	1,138	1,138

In the cases with normal tympanic membranes the adenoid operation was complete in thirty-four cases (74 per cent.), and in those with retracted tympanic membranes the adenoid operation was complete in 912 (88 per cent.). It is of considerable interest that patients, examined at varying lengths of time after operation, should present such an enormous number of retracted tympanic membranes. Some were slightly retracted, some markedly retracted, and some so much indrawn that they were in contact with the inner tympanic wall, outlining the promontory and showing the incudo-stapedial joint as an outstanding prominence. As these cases do not show the expected result—namely, the re-establishment of the air equilibrium in the middle ear and external meatus—it is apparent that a course of politzerization or Eustachian catheterization is frequently necessary after adenoid operations to re-establish the normal air pressure within the tympanum.

ACUTE AND CHRONIC OTITIS MEDIA

Below is discussed the effect of the operation on pre-operative acute and chronic suppurative otitis media.

Acute Otitis Media.—At time of operation twenty-six cases (thirty-one ears) were suffering from acute otitis media ; of these, twenty-one were unilateral and five bilateral. The tympanic membranes in eight ears were red and bulging, but not perforated. In the remaining twenty-three ears there was a perforation in the tympanic membrane in the following positions: anterior perforation, twelve ; central perforation, seven ; posterior perforation, one ; site unknown, three. Of the thirty-one ears so affected before operation, twenty-nine cleared up within a few days or weeks after operation. These included the eight cases without perforation of the tympanic membrane and one which required paracentesis six days after operation. In the two remaining cases the otorrhoea persisted ; in one the perforation was central and in the other anterior.

Chronic Suppurative Otitis Media.—At the time of operation seventy patients (in all 89 ears) suffered from chronic suppurative otitis media—fifty-one unilateral and nineteen bilateral. After operation otorrhoea ceased in fifty-five ears (62 per cent.) within a period of two weeks up to five months ; the perforations in the tympanic membranes healed in thirty-eight (43 per cent.) of these, but persisted (dry perforation) in seventeen (19 per cent.). Otorrhoea continued in thirty-three ears (37 per cent.) ; in two a Schwartze operation had been performed previous to the tonsil and adenoid operation. The remaining patient had a radical mastoid operation two and a half years after the tonsil and adenoid operation.

On examination of the ears in this group the position of the perforation and the pathological condition of the tympanic membranes were as follows:

	Dry Ears	Running Ears
Anterior ...	18 (12 perforations healed)	... 11 (6 with granulations)
Central ...	18 (11 ,, ,,)	... 9 (6 ,, ,,)
Posterior ...	10 (7 ,, ,,)	... 4 (2 ,, ,,)
Posterior marginal ...	5 (4 ,, ,,)	... 7 (6 ,, ,,)
Site unknown	4 (4 ,, ,,)	... 2
	55	33

At the time of the tonsil and adenoid operation there were seven cases of healed chronic suppurative otitis media. In one of these recurrence took place after operation. The effect of the adenoid operation on acute and chronic suppurative otitis media, considered in relation to the position of the perforation in the tympanic membrane, was that in cases with anterior perforations otorrhoea ceased in 71 per cent., with posterior perforations in 73 per cent., with posterior marginal perforations in 41.6 per cent., and with central perforations in only 29.4 per cent. On the whole, the results obtained by operation in cases of otorrhoea may be regarded as satisfactory.

PERSISTENCE OF SYMPTOMS AFTER OPERATION

The beneficial effect of the operation on the local symptoms is illustrated in this series of hospital cases by their disappearance in the great majority of the patients.

Throat Symptoms.—Attacks of sore throat occurred in 635 cases before operation, but only in thirty after operation. Choking sensation and difficulty in swallowing occurred in twenty-two cases: all were cured by operation. Cough persisted in eighteen out of forty patients after operation. Thick speech noted in thirty-eight cases remained the same in eighteen after operation. Patients complaining of lisps, stuttering, and hoarseness were not improved by operation. Three hoarse patients had singers' nodes on the vocal cords.

Nasal Symptoms.—Snoring, present in 798 patients before operation, persisted in only fifty-eight: of 408 mouth-breathers all but seventy-five were cured. Nasal catarrh and frequent colds in 629 patients continued to recur in 313. Epistaxis in fifteen cases was cured.

Aural Symptoms.—A marked improvement occurred in these. Deafness in 161 cases was cured in all but twenty-three, despite the indrawing of the drumhead. (Eleven deaf-

mutes were operated on for enlarged tonsils and adenoids, but were, of course, not benefited as regards their hearing.) Attacks of earache recurred in forty-five out of 152 cases after operation. Tinnitus in two patients (aged 8 and 12 respectively) disappeared. Acute suppurative otitis media healed in twenty-nine out of thirty-one cases, and chronic suppurative otitis media healed in fifty-six out of eighty-nine cases.

Patients complaining of headache (fifteen) and nocturnal enuresis (two) were not improved.

General Summary of Results in 1,138 Hospital Patients

The local symptoms for which the operation was recommended were completely cured in 851 (75 per cent.), partly cured in 204 (18 per cent.), but persisted in eighty-two (7 per cent.).

There was a marked improvement in general health in 982 (86.4 per cent.), but no improvement in 139 (12.2 per cent.). There were seventeen cases (1.4 per cent.) examined three weeks after operation—that is, too soon to estimate improvement in general health.

Discussion and Summary

On reviewing the post-operative symptoms and complications one sees that their total percentage is higher in the hospital patients (13.02 per cent.) than in the private patients (5.3 per cent.). If we exclude symptoms—for example, earache and cough—and complications—such as, exanthemata—we find that the percentage of 7.54 for complications in the hospital patients still remains higher than in the private patients (2.2).

The difference between the two figures can be accounted for as follows: (*a*) Some inherent factor is probably present in the preoperative condition of the hospital patients. Their general nourishment and constitution are, as a rule, inferior to those of the private patients, while in this hospital series several patients had predisposing factors in the causation of aural complications, and a number of them were possibly operated on in the prodromal stages of the exanthemata. (*b*) The results of hospital operations carried out by junior operators are not so good as those done by experienced surgeons in private practice. (*c*) Complications may be due to chill on the journey home in a taxi after operation; this was a possibility in the five cases of pulmonary complications, though the aspiration of septic blood clot during the operation—for example, in the case of bronchopneumonia, or of septic embolism from the operation area, as in the atypical case of pneumonia (right upper lobe) and in the two cases of pleurisy—cannot be excluded. No lung complication occurred in the private cases. (*d*) The only case of death after discharge from the Royal Infirmary was the case of meningitis. (*e*) No complication was found due to neglect of the parents to carry out written instructions given them for the preoperative and post-operative care of the children.

In this series of hospital out-patients, for whom every precaution was taken as to the general state of their health, their preoperative preparation, conveyance from the Infirmary to their homes, and the suitability of their homes for convalescence, the total percentage of complications was rather more than twice as high as that in the private cases. Considering the nature of some of the complications recorded in hospitals—for example, temporary torticollis, paresis of the soft palate, and nasal catarrh—the difference in the percentages is hardly of sufficient importance to make us condemn the present out-patient operation system and recommend hospital authorities to provide beds for all tonsil and adenoid cases. One acknowledges that the ideal post-operative treatment for these cases would be to detain the patient in hospital for at least forty-eight hours after the operation, but even with this precaution complications may occur. In support of this there are the statistics published by J. A. Keen in the *Journal of Laryngology* (January, 1932) in an article entitled "Medical and Surgical Complications of Tonsillectomy in Childhood." In his series of 9,344 cases each patient was kept in hospital for at least twenty-four hours after operation; sixty-six cases (0.66 per cent.) of aural complications occurred, consisting of sixty cases of acute suppurative otitis media and six cases of mastoiditis (including three deaths from this cause), as compared with our twenty-two cases (1.5 per cent.) of acute suppurative otitis media (no mastoiditis, and no deaths) in the Edinburgh hospital cases. Further, there were five cases of septicaemia (0.05 per cent.), including one death, in Mr. Keen's group, as compared with one case (recovery) (0.07 per cent.) in the Edinburgh group.

I wish to thank Dr. J. S. Fraser and Dr. W. T. Gardiner for allowing me to use the records of their private patients; also to acknowledge my indebtedness to Dr. J. S. Fraser and Dr. Logan Turner for their interest in, and helpful criticism of, this paper. Finally, I should like to thank Miss Watt and other members of the Royal Infirmary of Edinburgh Social Service Department for the records they obtained for me of cases which did not report for examination.

PULMONARY TUBERCULOSIS IN ASTHMA CASES

BY

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Among 522 cases of asthma seen in recent years there were 369 which I have investigated with a uniform method between 1930 and 1932—200 men and 169 women of the working class in active employment. In all of these cases a detailed examination was made both by clinical and *x*-ray methods for any signs of active or healed tuberculous lesions in the lungs (E. Fraenkel[1]).

Evidence from the Literature

The view that asthma and pulmonary tuberculosis are mutually exclusive is widespread in this country as well as abroad. Regarded from the statistical point of view there is undoubted justification for this attitude. The work of Schroeder,[2] for example, shows that out of 4,716 cases of pulmonary tuberculosis only thirty cases showed typical symptoms of asthma. Kaemmerer,[3] an experienced German clinician, considers that tuberculosis plays no part in the genesis of asthma. Bandelier and Roepke[4] believe that asthma may produce some immunization against the disease. In support of this we have the observation that tuberculous guinea-pigs appear to be protected against horse-serum shock; this is explained by Pagel[5] as due to diminution of antibody formation, which is dependent on the number of tuberculous foci. In conjunction with Pulvertaft[6] I have recently been able to show that a similar protection may be obtained by massive and repeated injections of Calmette's B.C.G. On the other hand, a single dose or the injection of dead or damaged B.C.G. was ineffective, and did not produce a local lesion. These results would seem to support in some degree the hypothesis of Pagel.[5]

Such authors of standing as Liebermeister,[7] Krez,[8] Zdansky,[9] and Wernscheid,[10] however, insist that the majority of asthma cases are of tuberculous origin. Harkavy and Hebald,[11] working at the Mount Sinai Hospital, report in a series of 400 asthma cases over 10 per

cent. as being tuberculous. Among these 400 cases eighteen were examined very thoroughly by the *x* rays, and seventeen of these showed cavities. In 1912 I[12] observed a case of bronchial asthma in which a tuberculous bacillaemia could be demonstrated by animal injection. Two cases of Kenner[13] and Loewenstein in 1931 gave similar results. Further evidence of a relationship between these conditions is presented by the demonstration of a filterable tuberculous virus in a case of asthma by Sergent and Kourilsky.[14] Jimminez Diaz[15] is of opinion that tuberculous allergy may bring about asthma, and later there may ensue a hypersensitiveness to other substances. On the other hand, Tauzk[16] is of opinion that asthma may predispose to tuberculosis. That tuberculosis is activated and accelerated by asthma is held by Lueg.[17] Opposed to this is the statement by Schroeder[18] that frequently in cases of coexisting asthma and tuberculosis the latter is of the slow and relatively unprogressive kind. The classical work of the late Professor von Pirquet[19] has made us familiar with the allergic phenomena associated with tuberculous infections. We are thus always faced with the possibility that this sensitization may be extended to other allergens.

Apart altogether from the theoretical significance of the simultaneous appearance of the two conditions, there can be no doubt, as has been shown by my own investigations,[1] by Eichhoff,[20] and by Hamann[21] working at my suggestion, that a careful investigation and assessment of a large number of asthma cases will reveal the presence of active, even cavernous, tuberculosis in some of them. Hamann has reported on eight of my cases with asthma and active tuberculosis, of which two died and two others developed tuberculosis within two years. The facts which I wish to present here are of a similar nature to those of these two authors, except that they rest upon a considerably larger material.

Results of Investigation

The 369 cases of my series were all sent to me with the diagnosis of bronchial asthma by medical men, among whom were specialists in pulmonary diseases. Investigation showed that, of these, sixteen patients had active tuberculosis. They could be classified as follows: four of open tuberculosis with demonstrable bacilli in the sputum, four others having cavities without demonstrable bacilli, and eight others with active tuberculosis both clinically and roentgenologically. Of the sixteen only one case had been sent with the diagnosis of asthma and tuberculosis. In addition to this we found in twenty-six other cases definite evidence roentgenologically of productive cirrhotic inactive tuberculosis. Finally, twenty further cases showed healed lesions. That is to say, that of the 369 asthma cases sixty-two (16.7 per cent.) showed signs of present or past tuberculous infection.

Pulmonary Tuberculosis in Cases of Bronchial Asthma

	Males (203)	Females (169)	Total (369)
Open tuberculosis	3 } 10* (5 %)	1 } 6 (3.5 %)	4 } 16 (4.3 %)
Active tuberculosis	7 }	5 }	12 }
Inactive tuberculosis	17 (8.5 %)	9 (5.3 %)	26 (7.0 %)
Healed tuberculosis	17 (8.5 %)	3 (1.75 %)	20 (5.4 %)
Total cases ...	44 (22 %)	18 (10.5 %)	62 (16.7 %)

* 4 had cavities.

Discussion

The epidemiological importance of tuberculosis undiagnosed on account of the concurrent symptoms of asthma is at once obvious. In two instances a suggestive history was obtained. In one the undiagnosed patient's wife developed tuberculosis of the eyes, and in another two children had tuberculous meningitis and pulmonary tuberculosis. Eichhoff[20] and Hamann[21] have also drawn attention to this danger, and there can be little doubt that it merits our serious attention. It would appear also—and I shall give an example of this—that a tuberculosis may become established after asthma alone has been recognized. Of course, the asthma may, as a result of an allergic predisposition, be at first monovalent, later becoming polyvalent. The possibility of a secondary hypersensitiveness to tuberculous allergens now arises. Thus, a chemist's assistant who possessed a sensitization to sodium salicylate with typical asthma later developed under our observation a rapidly progressive exudative tuberculosis with persistence of the asthmatic picture. That this patient had previously been completely free from tuberculosis there could be no doubt. Another case was that of a medical man who had had asthma practically all his life and became infected with tuberculosis whilst working in the tuberculosis department of a hospital. This infection led to cavity formation, and after treatment at Davos was followed by healing. The investigation of this asthma case is still continuing. On the other hand, the history of the patient frequently shows an "influenza" infection or a catarrh of the apex. In some of such cases there is found an inactive tuberculosis, which can only be demonstrated by the *x* rays.

The most important aspect of these observations is the fact that an active and open tuberculosis can be concealed for a lengthy period under the guise of a bronchial asthma with both eosinophilia and skin reactions against specific proteins.

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E. J. Canal Feijoo (*Rev. Med. Latino-Americana*, June, 1934), writing from the province of Santiago del Estero, draws attention to anomalous forms of leishmaniasis met with in his region and not described before. As they differ so widely from the ulcerative, impetiginous, ecthymoid, nodular, verrucous, framboesic, and non-ulcerative varieties, of which many observers have written, he considers them as constituting a true morbid entity, even though they are caused by the same germ. In great detail, and illustrated by a wealth of excellent photographs, he describes these indigenous forms as trichophytoid, erythemato-pigmentous, oedematous, and mucous, and gives the history of the evolution of each. From his communication it may be concluded that kala-azar, like other diseases, assumes aspects which differ in various regions owing to the influence exerted upon the germ by different telluric, climatic, and meteorological conditions.

Clinical Memoranda

UNREDUCED OCCIPITO-POSTERIOR PRESENTATION WITH SHORT CORD

The following account of a recent personal case seems of sufficient interest to be recorded.

The patient, aged 23, and formerly a typist, started labour at 6.30 p.m. two days after the estimated date. Abdominal palpation suggested an occipito-posterior position. At 4 a.m. on the following day dilatation was complete, the membranes ruptured, and the child's head descended lower in the occipito-posterior position. At 5.10 a.m. the presenting portion of the head was visible at the vulva. The pains were good, but not frequent, and the head could be observed rotating into the occipito-anterior position. When rotation was complete, the head was born at 7 a.m. With a sudden movement—almost amounting to a jerk—the head at once returned to its former occipito-posterior position, and there was no further progress in the birth. Considerable traction was necessary before the shoulders were born, and the anterior arm had to be completely extracted first. There being again no further progress, the head was pushed on to the mother's abdomen and steady traction was required to secure birth of the legs. An abnormally short umbilical cord was then discovered, which had prevented rotation of the child's body. This had to be divided with the child's abdomen pressed closely against the mother's vulva. Apart from the need for three perineal stitches and the subsequent occurrence of a slight prominence of the child's umbilicus, there were no ill effects from the tension on the cord. The third stage was normal, being accompanied by considerably less bleeding than is usual. The weight of the child was 7½ lb. Unfortunately no actual measurement of the cord was made.

London, S.W.11. F. P. N. PARSONS, M.B., M.M.S.A.

BILATERAL RUPTURE OF THE TENDON OF EXTENSOR POLLICIS LONGUS

In the literature at my disposal I can find no reference to a case of bilateral rupture of this tendon from any cause. It seems, therefore, that a record of the case might be of interest.

On March 5th, 1932, a motor mechanic, aged 30, was brought to my house following an accident with his motor-cycle, in which he was thrown into a ditch. He landed with his right hand doubled under him and the left hand extended in front. On examination the only wounds found were several superficial cuts about the hands. On the right hand there was a fair-sized cut extending from the first interphalangeal joint of the thumb to the back of the wrist, midway between the tubercle of the ulna and Lister's tubercle. It was not deep, and did not display the superficial fascia. On the left hand, over the "anatomical snuff-box," was a large bruise. The remaining abrasions were only superficial. No bony injury could be detected in the damaged regions, either by clinical examination or by radiography at a later date. The movements of both thumbs, although painful, were of normal range. The man received the usual treatment with anti-tetanic serum, and after cleansing the wounds they were dressed with tincture of iodine.

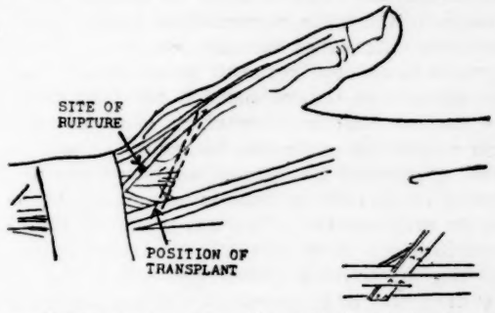
On March 9th the patient returned to tell me that he had felt something "go snap" in his right thumb while at work that morning. Since this he had not been able to use his thumb because of difficulty in manipulating the end. In fact, it was easy to confirm the man's statement, as he held his thumb up to view when he entered my room. The terminal phalanx drooped and could not be extended. Other movements were unaffected. The wound was dry, and healing in the normal manner; the swelling from bruising was almost gone. The tendon of the long extensor of the thumb could not be made out as a boundary of the "anatomical snuff-box."

It was decided to explore the region of the wound where it crossed the long extensor tendon. Accordingly, on March 10th, the wound over the thumb and the wrist was excised; the anaesthetic used was a "nerve block" at the elbow with 2 per cent. novocain, 15 c.cm. in all being used. This gave a perfect anaesthesia of the area of operation. The tendon was easily displayed, and there was found to be a rupture about half-way across its course as the boundary of the "snuff-box." The proximal end of the tendon was not in view. The ruptured end of the distal part was not ragged, but had the appearance of being cut with a not too sharp knife. The surface appeared normal and shiny. The small branch of the radial nerve proceeding up the radial side of the index finger crossed the tendon exactly at the point of rupture, and showed the effects of this relation in the form of a tiny blue fusiform swelling. (No area of anaesthesia had been detected previously.)

Search was now made for the end of the proximal part of the tendon, but was fruitless. The exploration was carried as far as the posterior annular ligament without result. An Esmarch bandage was applied from above down, but proved equally ineffective in bringing the end of the tendon into view.

With the state of affairs thus, it was decided to split the tendon of the extensor of the index finger, and having passed the distal end of the ruptured tendon through the split and back again, to suture it in this position. This was easily done, and the wound duly closed without drainage. The hand was then well wetted with surgical spirit, dried, and the dressing applied. A palmar plaster cast was then made to maintain the thumb and index in extension.

On March 21st the whole of the splintage and dressing was removed and the sutures taken out. The wound had healed neatly and firmly. The splint was cleaned, repaired, and



The smaller illustration shows the method of fixing transplant.

reapplied. The hand was inspected several times during the next eighteen days, passive movement being applied during this time. Active movements were started on April 12th. These were free but somewhat clumsy. The scar was healthy and firm without being adherent to any underlying structures.

In the meantime, on March 19th, the patient suffered an exactly similar occurrence to the left thumb: on this occasion the gap in the tendon could be felt in almost exactly the same place as the rupture had occurred on the right. Suffice it to say that on exploring the tendon the two ends were found little separated, being held together by some slight fibrous reaction, no doubt due to the resolution of the large haematoma that had occupied this space at the time of the accident. The ends of the tendon at the rupture were not sharply "cut" as they had appeared on the right side, but frayed and unhealthy-looking; there was a strong resemblance to a piece of string which had been cut through by fraying it on the edge of a sharp stone. The tendon sheath was adherent, both above and below the site of rupture.

The ends were cleaned and sutured with fine catgut. The obstructing fibrous tissue was cleared away as far as possible, and the wound closed, no attempt having been made to clear the adherent tendon sheath. The same procedure was carried out with this thumb as has already been described for the right thumb. The wound healed by first intention, and active movements were obtained after twelve days from the time of operation.

Now (March, 1933) I have seen the patient again in order to see the result. The left thumb functions as it normally did before the accident. The right thumb has improved remarkably, and functions nearly as well as before, but is a little awkward at times, when fine movements are required. The patient finds nothing to complain of in either hand, and can do all his work without any trouble.

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Reviews

GREEN'S PATHOLOGY

In editing the fifteenth edition of *Green's Manual of Pathology*,[1] Dr. H. W. C. VINES has not only submitted the book to a drastic revision, but has greatly enlarged it. The present volume is more than one-third larger than its predecessor, the 650 pages of the latter having been increased to 930. Moreover, 150 new illustrations have been introduced, and over a hundred of the old figures replaced by new ones, all of them of the best quality. In carrying out the revision Dr. Vines has had the assistance of Dr. K. M. Lynch, professor of pathology, South Carolina. The original division of the work into general and special sections has been retained, the author noting with disapproval the tendency to combine the two which is exhibited in some of the recent textbooks. In other respects the order adopted in the last edition has been considerably altered, as shown in the table of contents, which has been amplified in details and thus rendered more useful.

Additional chapters have been written on avitaminosis, diseases of the ductless glands, diseases of the breast, and diseases of the genital tract. Many sections and chapters have been amplified and brought up to date, the section on tumours of the brain, for example, having been nearly doubled; on the other hand, in a few instances the descriptions have been rendered more concise, as in the general account of tumours, which has been reduced by twenty pages. All sections show evidence of careful revision and of an endeavour to introduce such modern views as experience has proved to be sound, as in the description of the cells involved in inflammatory processes. It may be said that the editor has produced what almost amounts to a new book, yet it still retains the characters of the original *Green's Pathology*, which has probably always been the most popular textbook on the subject among English students, and in its new edition deserves to remain a favourite.

HEATING AND VENTILATION

The heat losses from the body of man are effected by means of radiation, convection, and the evaporation of moisture. When one of these processes is checked another develops compensatory activity, but they are not all equally comfortable, and their due adjustment so as to reduce discomfort, where the environment is amenable to control, is always important. Problems thus present themselves in the heating and ventilation of buildings for which engineers have devised solutions. Engrossed, however, in the mechanical or other complexities of practical schemes, the technical textbooks have been apt to pass too lightly over the fundamentals. To fill this gap Dr. H. M. VERNON has written a book[2] on the principles which underlie, or should underlie, current practice in these matters.

After referring to the kata-thermometer scale and the Pittsburg effective temperature, the author describes the eupatheoscope and the globe thermometer, which take account of radiation. He indicates how loss of heat by buildings may be reduced. He says of the coal fire that with its flue on an inner wall as much as 50 per cent. of the total heat goes to warming the house. The various methods of heating by hot water and steam are considered. The long low wall-type hot-water radiator beneath the whole length of windows receives commendation. The account of low-temperature radiant heating includes the panel system with embedded hot-water pipes, the non-embedded panels or rayrads, under-floor heating by air ducts as in Liverpool Cathedral, electric panels, and also electric tubular heaters.

In the chapter on natural ventilation the laws of flow in air circuits are cited, and the importance urged of having a ventilating flue in every habitable room. While natural ventilation through chimneys and flues is usually adequate for private houses, it may not suffice for schools, assembly rooms, and factories. In the chapter on mechanical ventilation the upward and downward methods for places of assembly, where lateral distribution might be difficult, are compared with one another. On the upward plan the fresh air is introduced low—in the House of Commons at floor level, in the Cambridge Examination Hall seven feet above the floor—and exhausted at the ceiling. On the downward plan—exemplified in the United States Hall of Congress and the Empire Cinema, London—the fresh air enters by way of the ceiling and is withdrawn at floor level. The concluding chapters deal with the control of humidity and air conditioning in industry.

The foregoing summary may convey some impression of the scope and contents of Dr. Vernon's book. Its merit can be fully appreciated only by perusal and study. We cordially recommend it, for guidance and information, not only to engineers, but to medical officers, factory inspectors, sanitary officials, and others who are concerned in their several ways with heating and ventilation.

NEPHRITIS

Dr. ROBERT PLATT'S *Nephritis and Allied Diseases*[3] is an excellent account of present-day knowledge. It is no mere compilation; the author has studied the authorities, but has in addition expressed his own views in writing the various divisions of the subject. That these views are orthodox and at the same time up to date makes the book a valuable one to place in the hands of the senior students and practitioners for whom it is designed. After a short introduction on the structure and function of the kidney, Dr. Platt discusses the renal function in disease, following mainly the modern theory of kidney secretion propounded by Cushny and elaborated by Verney and his co-workers, and the methods by which renal functional capacity is assessed. These are adequately and clearly dealt with. The clinical section which follows constitutes the main part of the book. Here the reader will find a full description of the aspects of the form of nephritis, chiefly seen in young people, in which three stages can frequently be recognized: an acute onset with haematuria and oedema, a prolonged oedematous stage, and a terminal stage without oedema. The two latter stages may be separately named "subacute" and "latent" respectively, and are followed by a chronic stage in which renal insufficiency has developed.

Many names have been proposed by the various writers on Bright's disease for these stages and the varied combinations of them which are met with in patients. Practitioners will find that Dr. Platt's descriptions will enable them to place their own cases under the appropriate heading so that the indications for treatment which he has so well detailed may be applied. The kidney changes and alterations of renal function in pregnancy, in hypertension and generalized vascular disease, in bacterial infections of the kidney and in affections of the renal pelvis and urinary tract are described, together with the treatment to be adopted. The reader will find a series of diet lists which can be used in hospital or private work, in-

[1] *Green's Manual of Pathology*. Revised and enlarged by H. W. C. Vines, M.A., M.D. Fifteenth edition. London: Baillière, Tindall and Cox. 1934. (Pp. xii + 928; 425 figures, 8 coloured plates. 25s.)

[2] *The Principles of Heating and Ventilation*. By H. M. Vernon, M.A., M.D. London: Edward Arnold and Co. 1934. (14s. net.)

[3] *Nephritis and Allied Diseases. Their Pathogeny and Treatment*. By Robert Platt, M.D., M.R.C.P. London: H. Milford, Oxford University Press. 1934. (Pp. 166. 7s. 6d. net.)

cluding two examples of ketogenic menus for the induction of acidosis in the treatment of coliform affections of the urinary tract. At the end of each section there are a few clinical histories illustrating the actual course of typical cases of the condition described. Dr. Platt's book strikes one as having just that amount of theory which makes the subject interesting, and the practical part is wholly good.

OBSTETRICS AND GYNAECOLOGY

The sixth volume of the *Practitioners' Library of Medicine and Surgery*, dealing with *Obstetrics and Gynaecology*,[4] is a handsome and clearly printed book, which runs to about 1,000 pages, a generous amount of space being devoted to lists of contributors, tables of contents, and index. The general purpose of this library is to " present material which is pre-eminently of practical utility to the man in general practice." Most of the contributors are apparently relatively junior men of the status of associate professor or instructor. The article on diseases of the uterus is by a clinical associate in surgery of the University of Oregon.

The opening chapter deals appropriately enough with development. In order to obtain an insight into the difficult subject of embryology the reader is advised that " the mind must conceive of four functions simultaneously —length, breadth, depth, and time." The practitioner need not be discouraged at being asked to visualize these abstractions as functions, for the descriptions which follow are clearly written and well illustrated. A short section on the chronology of foetal development is particularly interesting and useful. In discussing the hygiene of pregnancy the author, Dr. Emerson L. Stone of New Haven, strikes a note of optimism which is hardly justified when he writes that pre-natal care and the development of obstetrics have been " the chief factors in the achievement of a negligible rate of morbidity and mortality for mother and child." The view that the present rate of maternal mortality is negligible is certainly not shared by the senior obstetric teachers in the United States, as has been shown by recent reports from the White House Conference and the New York Academy of Medicine. The detailed advice given about ante-natal care and about the home equipment necessary for a confinement is sound and adequate.

Professor Karl L. Wilson of Rochester, N.Y., has contributed an admirably written and well-illustrated account of normal labour, which readers of this System will value as a reliable and practical guide. In discussing the physiology of the puerperium full consideration is given to recent experimental work on the hormonal influences which excite and regulate lactation, while the possible influence of the placenta as an inhibitor of lactation is also considered. In this article an admirable balance is maintained between scientific advance and practical requirements, for the clinical details dealing with the process of nursing and the care of the breasts are entirely praiseworthy. Many useful recommendations with regard to posture and exercises are also given. One of the most interesting contributions is that of Professor Thoms of New Haven on the pathology of labour and the puerperium. In writing of subnormal expulsive forces the wise remark is made that women who show " more or less marked asthenic tendencies cannot be expected to be athletes in the process of parturition." The treatment recommended for inertia in the first stage is one-quarter to one-sixth of a grain of morphine, and, after the patient has slept, one to two ounces of castor oil, followed by the controlled use of pituitrin by intranasal application until labour is actively progressing. Dealing with the prevention of post-partum haemorrhage, Professor Thoms states that it is his rule never to leave the bedside of a patient for at least an hour, even if a competent nurse is in attendance ; this is an admirable example for a teacher to set his students.

The description of gynaecological conditions has been considerably abbreviated by the omission of all details of operative procedures. The clinical pictures are, however, well drawn both with pen and with pencil, and the aim of the contributors in this part of the work has clearly been to emphasize only those aspects in which the general practitioner is directly interested. It cannot be doubted that the American doctors who consult this work and follow its advice will be well equipped in the departments of obstetrics and gynaecology.

[4] *The Practitioners' Library of Medicine and Surgery*. Vol. vi. *Obstetrics and Gynaecology*. London: D. Appleton-Century Company. 1934. (Pp. xlv + 900 ; illustrated. 50s.)

LATENT PLUMBISM?

The reader will be somewhat surprised to discover that under the title of *The Menace and Geography of Eclampsia in England and Wales*[5] Dr. NORMAN PORRITT has developed the disturbing hypothesis that a considerable section of the population of this country is either actually suffering from, or is exposed to the menace of, a latent form of lead poisoning. The author's thesis is that a mild form of plumbism exists, hitherto unrecognized by the medical profession, which reveals itself, not by the classical signs and symptoms, but by a symptom-complex which in fact (although the author does not say so) resembles that of general neurasthenia. The proof of this hypothesis offered to the reader is that a series of such cases have come under the personal observation of Dr. Porritt, in which the subjects were found to be drinking water which contained a variable amount of lead, and were also excreting lead in the urine. Some of these persons who went away from home for a change were relieved thereby of their symptoms, but the reader is not told that the drinking water in the new places of abode was shown by analysis to be free from lead. In no case apparently was it demonstrated that along with the disappearance of the symptoms the urine became free from lead, nor is it shown that the severity of the symptom-complex was proportionate to the amount of lead in the water or to the amount excreted in the urine. The author's lament that he failed to convince the medical officer of health of the town in which he then practised of the truth of his theories seems scarcely justified. Who could be convinced by such incomplete evidence?

In this book Dr. Porritt advances the further theory that lead in drinking water, even in very small amounts, constitutes a predisposing cause of abortion and of eclampsia. The evidence adduced is that the mortality from " eclampsia and other accidents and diseases of pregnancy " is higher in districts supplied with soft, plumbo-solvent water than elsewhere. Dr. Porritt rightly draws attention to the well-known abortifacient action of lead exerted through its destructive influence upon chorionic tissues. Lead also injuriously affects the functional activity of the kidney, and so may predispose to the occurrence of eclampsia. All this is undoubtedly possible, but unfortunately the statistical material requisite for properly testing the theory was not available to the author. The group figures upon which he relies include other causes of maternal death of equal importance to eclampsia. It would seem very improbable that the Public Health Service can have overlooked a latent form of plumbism due to potable water, as the author would have us believe. In any case the questions he raises are for the medical officer of health, not the obstetrician, to deal with.

[5] *The Menace and Geography of Eclampsia in England and Wales*. By Norman Porritt, M.R.C.S., L.R.C.P. London: H. Milford, Oxford University Press. 1934. (Pp. 88. 5s. net.)

OCULAR ASTIGMATISM

Astigmatism of the refractive media of the eye was first discovered by the English physiologist Young in 1801 : twenty-six years later the Cambridge astronomer Airy made the first correction of the defect by the use of cylindrical lenses. Since then there have been many investigations into the causes of the defect. At one time, owing to the work of Javal, there was a tendency to ascribe the finding to irregularity of the corneal surface, and with his ophthalmometer measurements of the inequalities of the curvature of the eye were made. The perfection of the instrument showed, however, that though the anterior surface of the cornea was a large factor in the production of the defect yet the total astigmatism varied considerably from that of the cornea ; it might be more or less, and the axes of the corneal and total astigmatism might vary. It became evident that other surfaces of the refracting media took part in the production of the defect, and the measure of the whole by means of retinoscopy was more accurate and useful than the measure of the corneal surface. In a recent monograph on *Biastigmatisme*,[6] by Drs. M. MARQUEZ and T. BUSTO of Madrid, there is presented a detailed discussion of these matters, and therewith a consideration of the value of correcting astigmatism by means of bicylindrical lenses, set at varying angles to each other so as to produce a great variety of fine corrections. The authors have worked out a series of tables which give the values, in spheres and cylinders, that result from these combinations.

Notes on Books

In *The Healthy Infant*[7] Dr. E. R. C. WALKER has given a very clear account for the intelligent mother of how to manage her child. Besides describing in detail the general principles of diet and hygiene, Dr. Walker has successfully shown the reasons for many of the measures advocated, and he includes a very good adaptation of modern psychological teaching for use in regard to the early period of life. It is possible to find fault with small, almost controversial, matters in certain sections—as, for example, the advocacy of one breast at a feed instead of both—but in general the presentation of teaching where there is room for a difference of opinion is scrupulously fair, and the intelligent mother should easily be able to make up her mind upon a course of action. It is a pity that while such elementary details as care of the nails receives mention, there is no discussion of what the mother is to do about the foreskin. Professor Charles McNeil has written a foreword commending Dr. Walker's book, and with what he says there we heartily agree.

A book which has proved highly popular with nurses is the *Complete System of Nursing*, by A. MILLICENT ASHDOWN ; it has been reprinted eleven times since 1917. The author has now issued her book with certain additions and deletions as *A Complete System of Nursing for Male Nurses*.[8] For this purpose chapters dealing with diseases of women and children have been deleted and several illustrations have been added. The volume treats of the general duties of a nurse and the minor surgical and medical procedures which the nurse may be called upon to carry out—such as drawing off stomach contents, the testing of urine, catheterization, etc. The application of bandages, splints, extensions, etc., is fully treated. A chapter on the general observation of symptoms appears to be particularly helpful. Medical nursing, with general descriptions of various diseases and the special points of attention required from the nurse in each, is treated with considerable fullness, and surgical nursing is similarly dealt with. Special chapters are devoted to ophthalmic nursing, nursing in diseases of the ear, nose, and throat, massage, medical electricity, the administration of drugs, and treatment of poisoning, and there is a brief, final chapter on diets and sickroom cookery. This book, like the manual upon which it is based, should prove very useful to nurses.

Mr. J. E. R. MCDONAGH has now written the third volume of *The Nature of Disease Journal*.[9] Like its two predecessors, this is a substantial book of more than two hundred pages in which the author presents his original (one might almost say his unique) views on medical problems. The chief subjects discussed in volume iii are included under the headings " Rheumatism," " Women's Diseases," and " Infections from Within." There is also an editorial on the origin and nature of disease, and a chapter on the factors which determine the part of the body selected for attack in disease. The book will be added to the Library of the British Medical Association.

[6] *Le Biastigmatisme dans la Pratique. Tables pour la Transformation des Verres Bicylindriques d'Axes Obliques en Verres Sphéro-cylindriques.* By M. Marquez and T. Busto. Second edition. Madrid: J. Cosano. 1933. (Pp. 55. 5 pesetas.)

[7] *The Healthy Infant.* By E. R. C. Walker, B.A., M.B., F.R.C.P. Edinburgh: W. Green and Son, Ltd. 1934. (Pp. 137. 3s. 6d. net.)

[8] *A Complete System of Nursing for Male Nurses.* By A. Millicent Ashdown. London and Toronto: J. M. Dent and Sons, Ltd. ; New York: E. P. Dutton and Co., Inc. 1934. (Pp. xvi + 639 ; illustrated. 12s. 6d. net.)

[9] *The Nature of Disease Journal.* By J. E. R. McDonagh, F.R.C.S. Volume iii. London: William Heinemann (Medical Books) Ltd. 1934. (Pp. 245. 10s. 6d. net.)

Preparations and Appliances

ANAESTHETIC SHIELD FOR USE IN MASTOID OPERATIONS

Mr. C. HAMBLEN THOMAS, F.R.C.S. (London, W.1), writes:

In mastoid and other operations on the ear, when the face is covered by the usual towel to shield the operation area, there is always a certain amount of discomfort to the operator and the anaesthetist. The latter has difficulty in keeping the patient's face under observation for the state of the pupils, etc., and a possible seventh nerve twitch of the face muscles, and the former is apt to have his towels and instruments displaced by the anaesthetist's manipulations. I have had made for me a simple and cheap metal shield, on the principle of the pattern I saw at the Manhattan Ear and Throat Hospital, New York.

Its method of use and its appearance when folded are illustrated here. When folded it is less than the size and about the thickness of this *Journal*, and it is easily packed. When in use it has sufficient rigidity to maintain its position. It can be sterilized, or it can be covered with a narrow sterilized towel folded around it. The lower plate is placed between the under side of the patient's face and a flat surface on which the patient's face (which has been turned well over) lies. The upper plate can be fixed by tapes or by towel clips engaging the upturned edge of the plate and the other towels around the patient's head. This upper plate acts as a small instrument table for the assistant.

The shield is made for me by Messrs. Arnold and Sons (John Bell and Croyden), 52, Wigmore Street, London, W.

VIONASE TABLETS

Vionase tablets (Wilcox, Jozeau and Co. Ltd., London) contain medicinal yeast (2½ grains per tablet), exsiccated ferrous sulphate (2¾ grains per tablet), and small quantities of copper and manganese. They are recommended for the treatment of microcytic anaemia, and also for neurasthenia, debility, etc.

British Medical Journal

SATURDAY, SEPTEMBER 15th, 1934

THE ACTION OF INSULIN

In no section of metabolic research has more intensive work been carried out than in that of carbohydrate metabolism. The dramatic results obtained by the application of insulin to disturbed sugar metabolism need no comment at this stage. From the clinical point of view, one of the most outstanding results of insulin treatment is gain in strength, and this is true even when the patient is still not completely stabilized. From a condition of weakness, which may render the diabetic subject a pathetic figure, there gradually or sometimes rapidly is brought about an increase in muscular power which astonishes even the practised specialist in diabetes. There can be no doubt that insulin produces in some peculiar way a re-establishment of those processes in the muscles which lead to a normal capacity for work. This is undisputed, and yet the actual mechanism of this extraordinary result is entirely obscure. In a recent series of lectures Macleod[1] enters in some detail into the experimental work in this field, but, interesting as are the results of individual experiments, the problem is not very much nearer solution. The well-known researches of Dale and his collaborators, showing that in the eviscerated, decapitated, and glucose-perfused cat the injection of insulin produces an amount of glucose oxidation and glycogen deposition in the muscles exactly accounting for the disappearance of glucose from the perfusing fluid, are strongly criticized by Macleod. Whilst Dale's results were of a precision that appealed to the physiologist as apparently demonstrating an almost mathematical accuracy in a biological experiment, the clinician continued to wonder what the relation was between a very depleted and abbreviated cat and a normal or diabetic subject. Macleod, however, has again marshalled very strong evidence against the hypotheses and assumptions made in these perfusion experiments.

An outstanding source of error in the usual methods of calculation is the interpretation of the respiratory quotient. Cathcart some years ago insisted that the non-protein respiratory quotient is not a true oxidation quotient, and more recently Thunberg goes so far as to say that *none* of the oxygen used in general metabolism is found in the expired CO_2, but that it is transformed to water. Investigation of the mechanism of insulin action in the intact animal is complicated by so great a number of accessory mechanisms that it seems almost impossible to expect any all-embracing conceptions to emerge. Macleod has reinvestigated and extended the *piqûre* experiment of Claude Bernard, and has shown that carbohydrate metabolism is, at least in part, under the control of a centre or centres in the upper part of the pons. Interpreting his results, he considers that the process of glyconeogenesis is under the control of the parasympathetic, and glycogenolysis under that of the sympathetic. In conjunction with these purely nervous controls must be considered the demonstrated existence of a diabetogenic influence exerted by the anterior pituitary. This has been shown strikingly by Houssay, who found that removal of the pituitary before pancreatectomy prevented the development of typical pancreatic diabetes. In this connexion the association of glycosuria, and sometimes of true diabetes, with acromegaly must be kept in mind. There is also the delicately adjusted response of the adrenal gland to changes in blood sugar, directed to maintaining the latter at normal levels.

The recent striking findings of Ellis,[2] showing that patients with severe diabetes can tolerate enormous doses of glucose with doses of insulin not exceeding, and even less than, those necessary for stabilization on restricted diets, will give an important impetus to new ways of thinking on the pathogenesis of diabetes. Ellis's work will require extended investigation before interpretation will be possible, for he does not give in his paper any metabolic figures except those of blood sugar and qualitative urinary findings. These results, at any rate, dispose of the common notion that diabetes is entirely a matter of pancreatic dysfunction. The older view that insulin produces some change of alpha-beta glucose into a more active form has never been convincingly substantiated, but it is significant that so eminent an authority as Macleod should state that he has "a suspicion that insulin acts primarily on the glucose molecule and that the various physiological effects which follow its injection are secondary to this change."

[1] *Bull. Johns Hopkins Hosp.*, February, 1934, p. 79.

RECONSTITUTED AND SOPHISTICATED MILK

The establishment of the Milk Marketing Board, and elimination of the "cut price" wholesale milk upon which considerable profits were made, has led to ingenious devices for replacing lost incomes. One of them which has recently been engaging the attention of the ever-vigilant guardians of the public health is a new device to enhance the value of skimmed milk. This can be bought on a large scale for something in the neighbourhood of a penny a gallon, and, if cream is added to it, the result is a fluid resembling genuine milk. Skimmed milk powder is a cheap article of commerce. If this is dissolved in water and cream added the resulting solution is something not easily distinguishable from the natural secretion of the cow. Sold at about a shilling a gallon, this product of cream and skimmed milk, or skimmed milk powder, yields an enormous profit. It is true that few would

[2] *Quart. Journ. of Med.*, April, 1934.

accept it as real milk did they know the method of manufacture; but it is an extremely difficult matter to stop the traffic because, after all, this commercially made solution contains the ordinary constituents of cow's milk and passes the ordinary tests applied by the food inspector. The percentage of water and cream can be regulated to a nicety.

It must not be forgotten, however, that while the minimum fat content of milk as laid down in the Milk Regulations, 1901, is 3 per cent., the average fat content of genuine cow's milk is approximately 3.6 per cent. It is not surprising that the manufacturers of this product are concerned more with satisfying the legal minimum than with the preparation of a product as rich in fat as genuine milk. In consequence the artificial product often yields on analysis the bare minimum or little more in fat content. In other words, this product is 20 per cent. deficient in fat, and it has been pointed out that milk which consistently yields on analysis a fat content of 3 per cent. or thereabouts is open to grave suspicion. Now that attention has been drawn to this product food inspectors will be on the alert. There is one further loophole in the armour of the faker: the Milk and Dairies Order, 1926, states that the vessels used for the conveyance of skimmed or separated milk or for containing such milk at any time when it is exposed for sale must be marked with the words "skimmed" or "separated" milk. Naturally the persons concerned in the concoction of "pseudo" milk are not anxious to advertise their activities and in some cases the label has been omitted and the law broken. There is need, however, for tightening up the law in this respect because the Article of the Order in question does not clearly indicate whether churns containing skimmed milk are required to be marked as such when in a dairy and not exposed for sale.

There is a second device, to which the Medical Officer of Health for Kensington has drawn attention. This is the addition of skimmed milk to ordinary milk in contravention of Section 4 of the Milk and Dairies (Amendment) Act, 1922, which provides that: "No person shall add any colouring matter or water or any dried or condensed milk or any fluid reconstituted therefrom or any skimmed milk or separated milk to milk intended for sale, and no person shall, either by himself or by any servant or agent, sell, or offer or expose for sale, any milk to which any such addition shall be made." It was discovered that skimmed milk to which a quantity of cream had been added was being mixed with ordinary milk, the product being sold as genuine milk. The result of adding cream to skimmed milk in the proportion of one gallon of cream to sixteen gallons of skimmed milk is to produce a liquid with a fat content slightly below the minimum standard of the milk regulations. Genuine milk, of course, contains fat in excess of the proportion required by law. The result of the mixture of the two fluids is a product with a fat content above the legal minimum but less than the average obtained from genuine milk. By this device is obtained, in addition to the legitimate trading profit, a further 9s. 6d. per churn of seventeen gallons.

Both devices—the reconstitution of milk from milk powder and the sophistication of milk by the addition of skimmed milk—are dishonest and undesirable practices. Present legislation is by no means adequate to deal with these new activities. The Kensington Town Council suggests that by new legislation the storage of milk powder on registered dairy premises should be prohibited; that dealers in skimmed milk should be registered and required to keep accurate records of consignments of skimmed milk arriving at or leaving the premises; that vessels containing skimmed milk should at all times be marked with the words "skimmed milk"; and, finally, that legislation relating to the addition of skimmed milk to milk should be amended so as to provide that milk includes cream. Great efforts are being made to improve the purity and quality of the most valuable of foods—milk. It is of first importance to stop the activities of persons who, in pursuit of personal profit, are placing on the market as genuine milk a liquid which is reconstituted or sophisticated.

CANCER CLAIMS

The recent publicity given by the Press both in this country and abroad to the alleged discovery of the cause of cancer by Dr. W. von Brehmer, a member of the Reich Biological Institute in Berlin, cannot pass without comment. Dr. von Brehmer[1] brings forward a hypothesis which rests on two series of observations—one physico-chemical and the other bacteriological. The first deals with the hydrogen-ion concentration of the blood, which he claims to be highly alkaline in cases of carcinoma, and the second purports to show that it is possible to isolate an organism from the blood and tumours of human beings and animals suffering from cancer, an organism which is only capable of active growth in an alkaline medium. From these observations he concludes that conditions which bring about marked alkalinity of the blood produce a suitable pabulum for the growth of the organism in question, which is responsible for the proliferation of the epithelium to form a cancerous growth.

In the first place, it would appear hardly believable that the extreme degrees of alkalinity of the blood claimed to have been observed by Dr. von Brehmer—as great a *p*H as 8.2 is described by him in an earlier article[2]—would be compatible with the continuation of life, and it is certainly contrary to previous belief and experience. This matter has been taken up by Professor Heubner and Dr. Druckrey,[3,4] who investigated the method adopted and have come to the conclusion published in the *Klinische Wochenschrift* that the palladium-hydrogen electrode hitherto used in the investigations

[1] von Brehmer, W.: *Med. Welt*, August 25th, 1934, No. 34, p. 1179.
[2] Idem: Ibid., December 9th, 1933, No. 49, p. 1737.
[3] Druckrey, H.: *Klin. Woch.*, July 14th, 1934, No. 28, p. 1027.
[4] Heubner, W., and Druckrey, H.: Ibid., September 8th, 1934, No. 36, p. 1284.

gives results which are so wholly inconsistent that no correction factor is capable of making them reliable. If this is so it is clear that the whole of the alkalinity theory is open to very grave doubts.

In regard to the organism isolated, Dr. von Brehmer gives an elaborate and lengthy description which forms the greater part of his publication. Its morphology appears to be highly complicated, and it only assumes a bacillary or " tubular " form in the blood when the latter is alkaline, or in a special highly alkaline culture medium. The life-cycle is elaborate, and no fewer than seven stages are described. In alkaline broth it grows as a pellicle, is motile, and forms spores under unfavourable conditions. When growing actively some forms break up and discharge fine granules, which are capable of regenerating into the tubular form. In acid broth it breaks up into minute bodies, which are filter-passing and which vegetate when returned to an alkaline medium. With such an elaborate morphology it is not surprising that Dr. von Brehmer reserves for a future date the placing of his organism in an ordered classification, but disappointment must be expressed at seeing in the text of his article published in the *Medizinische Welt* large-scale drawings containing detail almost, if not quite, beyond the limits of microscopical visibility, and yet not seeing a dark-ground photomicrograph of sufficiently high power or definition to show any detail.

When consideration is given to the significance of such an organism, many questions arise which require satisfactory answers before its connexion with the aetiology of cancer can be accepted. First, there is the question of contamination during manipulation. Professor Schilling[5] has carried out isolation experiments on the same lines and claims to have obtained similar organisms with complicated morphological forms. It is not to be suggested that any but the most careful manipulation was employed in either case, but at the same time bacteriologists will agree that there is a certain crudity in obtaining blood for cultivation from a finger prick and in grinding up a portion of a tumour in a mortar with saline solution and transferring a copious inoculum of the emulsion for cultivation in a fluid culture medium, the technique for both of which procedures is described. Then there is the question whether the tumour may not be harbouring some non-pathogenic organism. It is well recognized that in dealing bacteriologically with tissues it is not uncommon to meet with organisms of one kind or another which have invaded the tissues but which have no aetiological significance. Further, it does not appear that the most elementary of all questions has been satisfactorily answered or discussed—namely, whether the organism is constantly found in cases of cancer and in no other conditions. There is no information given as to how many cases have been investigated or from how many cases the " tubular " form of the organism has been isolated ; nor is there information as to whether the organism has been sought for in, for example, lymphadenoma or the granulomas—conditions which might well serve as controls. Lastly, there is so far no real evidence that a pure culture of the organism will reproduce the condition in animals. Dr. von Brehmer claims that it does do so, but reserves this most important point for future publication.

That Dr. von Brehmer and his associates have been carrying out their work for many years is well known, and last year, from information received, it was expected that an important communication would be made at an early date. It was hoped that such proof as was wanting would become available. Careful perusal of the data must, however, point in one direction only—namely, that the highly alkaline condition of the blood described in cancer patients is a myth, and that the idea that the organism isolated, whatever it be, acts by virtue of its ability to thrive only in alkaline medium is therefore irrelevant, and, further, that there is so far no proof forthcoming that it is a factor in the aetiology of cancer. It seems highly probable that the present claims will sink into obscurity, and, like many such claims in the past, will leave no impression on cancer research. Let it suffice to add that information received from the recent medical congress at Frankfurt indicates that the many eminent scientists present there, who heard the communications and also saw the slides and photographs exhibited, were entirely unconvinced.

Cancer " cures " and the alleged discoveries of the cause of cancer have been flooding the world of late years, especially in more recent months, since the taboo of the word " cancer " has begun to disappear. It is no exaggeration to say that during the last decade more than 500 such " cures " or " discoveries of the cause of cancer " have been investigated. It is true that the majority of these are frivolous in the extreme, but a fair proportion are built upon a basis of fact, and who is to say there is nothing in them? Experience has shown, however, that any real advance in our knowledge concerning cancer is obvious and credible from the start, and that those theories and hypotheses which, when fully examined, are found not to be based on sound argument and accurate and controlled observations have invariably fallen to the ground. The time has come for the public to be educated to think of cancer as they think of other ills, and not to consider it to be a thing unclean and not to be discussed. The greatest fear is the fear of the unknown, and knowledge regarding cancer and its nature largely dispels that fear of falling victim to the disease which is so prevalent in the minds of the community. At the present time the greatest hope of safety lies in early diagnosis. Fortunately, early diagnosis can be made with little difficulty in those forms of cancer which are the most common. It only requires the co-operation of the public to bring the patient and the doctor together in the early stages to effect a permanent cure in 50 per cent. of these more common forms. Let us educate the public to become aware of the problems of cancer and of the stages already reached in investigation and treatment, rather than let them catch at any straw in the shape of alleged cures which may drift their way.

[5] Schilling, V.: *Med. Welt*, August 25th, 1934, No. 34, p. 1186.

INFANTILE CONVULSIONS

An association of general practitioners in France, under the name of *Assises Nationales de Médecine Française*, was founded to study in the everyday life and experience of its members various problems which could only receive a fragmentary type of investigation at the hospitals and clinics. A recent meeting dealt with the subject of infantile convulsions, and the discussion has been summarized in an article by Dr. P. Hartenberg.[1] It is pointed out that there are at least four schools of thought on convulsions in infancy: one holds that all such fits are epileptic, with the same aetiology as in adult life; one denies this view and thinks convulsions have a relatively banal importance without any relation to epilepsy; one holds that the underlying cause in all cases is tetany; and a fourth doctrine admits the possibility of all three preceding views. While the congress did little to elucidate this fundamental problem of causation it reached agreement on many points. It was reported from every area that there has been a great diminution in infantile convulsions in recent years, and that the actual fit must be regarded as a symptom of some more radical malady. The list of existing causes contains such well-known disturbances as fevers, gastro-intestinal infections and parasites, dentition, meningo-encephalitis and birth trauma (including asphyxia), while a familial predisposition was also noted in many instances. Syphilis was admittedly not as common as has been previously taught, while an alcoholic heredity is rarer than heretofore. In general the assembled practitioners thought that spasmophilia was an unusual factor in convulsions. It was agreed that the immediate prognosis is better than formerly, there being fewer fatal cases; but as to the eventual prognosis, especially concerning the possible development of epilepsy in later life, there was difficulty in reaching agreement as to the necessary criteria for prophecy. The proportion of all infants with fits who develop mental deficiency, paralysis, or epilepsy was variously put between 1 and 10 per cent. Dr. Hartenberg expressed a personal view by stating that the only guiding line is the presence or absence of a cerebral lesion. Another recent review[2] of the causation of convulsions in childhood by Dr. M. Peterman approaches the subject from a different aspect, and the conclusions have a bearing on the special period of infancy. The author has reviewed 500 cases in children brought to him in hospital or private practice for fits in the past ten years. The percentage distribution is as follows: epilepsy (idiopathic), 33; acute infection, 22.8; cerebral birth injury or residue, 15.4; spasmophilia or tetany, 13.6; miscellaneous, 8.8; and cause unknown, 6.4. Taking the period of infancy in more detail, Dr. Peterman shows that with six to thirty-six months as the age of onset acute infection heads the list with nearly 30 per cent., and spasmophilia is next with 22.4 per cent. His cases have been very fully analysed, with investigation of the blood chemistry when necessary, so that in this series tetany looms larger than in the French report. "It is only when the convulsions recur," he writes, "and after various unrelated stimuli and when all organic lesions are excluded, that the diagnosis of idiopathic epilepsy is made." With this strict method of diagnosis Dr. Peterman is able to select three cases in the first month of life and a further five between one and six months of age as definitely epileptic. It is obvious, therefore, that although the percentage of such cases in the whole series is small, the occurrence of epilepsy among babies with convulsions cannot be excluded, and time must elapse before a final statement is made. A conclusion drawn by Dr. Peterman may be quoted to summarize the whole matter: "It is obvious that a convulsion is only a symptom, the final explosion of a complex reaction, the trigger mechanism of which may be a number of factors. . . . I wish simply to point out that there are certain disease entities which create in a patient a susceptibility to the convulsive state." While disagreeing in detail the French and American views are united on this point.

[1] *Presse Méd.*, June 2nd, 1934, p. 895.
[2] *Journ. Amer. Med. Assoc.*, May 26th, 1934, p. 1729.

CHEVALIER JACKSON AND ENDOSCOPY

Killian has been called the "Father of Bronchoscopy," and, as the title indicates, he originated endoscopic methods upon which all later work has been founded. There is, however, no one either in the past or in the present who has contributed so much to the advancement and development of endoscopy as Dr. Chevalier Jackson. When *Peroral Endoscopy and Laryngeal Surgery*, completed in 1914, was published in 1915, it seemed as though no further territory remained to be explored and conquered by the endoscopic method, to such perfection had its technique been brought by Dr. Jackson and his staff. That book will always remain a milestone in the history of laryngology and a treasured possession of the fortunate, but when Dr. Jackson, in collaboration with his son, presents, twenty years later, *Foreign Body in Air and Food Passages*[1] it is interesting to endeavour to trace in what direction subsequent advances lie. The book in question makes no attempt to cover the whole field of endoscopy, but it is in the localization and removal of foreign bodies that the great triumphs have been won, and it is here shown how close the collaboration between the radiographer and the endoscopist must be. The sixteenth volume of the *Annals of Roentgenology* is much more than an atlas of *x*-ray pictures, which is all that it claims to be. Selected from a study of 3,000 cases of foreign body in the air and food passages, in order to illustrate the different pathological effects produced, the difficulties in finding opaque foreign bodies, the methods of recognizing the presence of non-opaque foreign bodies, the necessity of lateral in addition to antero-posterior views and sometimes of views from intermediate angles, and the possible errors in localizing foreign bodies which are plainly visible, the pictures, with the comments and the lessons which they teach, are an endoscopic education in themselves. The chapter at the end on fluoroscopic endoscopy for removal of foreign bodies which are endoscopically invisible shows how close and perfect this collaboration can be, and with what ingenuity the latest model of biplane fluoroscope had been constructed. Figure 137 and those immediately following need no comment beyond the simple statement that a bar pin is shown deep in the lower lobe of the right lung. The

[1] Chevalier Jackson and Chevalier L. Jackson: *Ann. of Roentgenol.*, vol. xvi. New York: Paul B. Hoeber, Inc. 1934. (Pp. 265; 236 figures. 12 dollars.)

case was published as beyond the limits of bronchoscopy in 1907, the patient being a woman then aged 18. In 1930 extensive pathological changes were seen to have developed in the intervening twenty-three and a half years. Yet the pin was removed in two and a half minutes from the patient at the age of 43—a demonstration of the progress made in the technique of bronchoscopy. That foreign bodies hidden in the extreme periphery of the lung, even in the costo-phrenic angle, can now be removed endoscopically provided that the skill, the equipment, and the collaboration are available seems to leave nothing fresh to be accomplished in the art of removing foreign bodies.[1] Future advance seems to be in the application of endoscopic methods to the treatment of morbid processes, but it remains for the few to whom opportunity is given to maintain the exacting standard which Dr. Jackson has set.

THE STUDY OF ANIMAL BEHAVIOUR

Several of the papers presented to the British Association at its meeting in Aberdeen, and of the discussions following thereupon, have emphasized the fact that the results of scientific analysis, especially in physics and physiology, must be taken simply for what they are, and not regarded as ultimate realities by a summation of which the whole, particularly the organic whole, can be reconstructed or explained. In biology, for example, it is found to be essential to study the organism as a whole and not simply its component parts or systems. This tendency of present-day science is, in fact and in effect, a harking back to common sense. On August 25th last (p. 361) we noticed an important book entitled *The Behaviour of Animals*, by Dr. E. S. Russell, in which this point of view in relation to its subject was admirably expounded and illustrated. In his presidential address to the Section of Zoology Dr. Russell made an excellently clear and reasoned statement of the same thesis. It was a noteworthy utterance to which the attention of all who are interested in the teaching or the study of biology and physiology should be directed. He contests alike the dualism of mind and matter, the mechanistic explanation of all physiological processes, and the underlying assumptions of the stimulus-response theory of animal behaviour. It is necessary to get back from Descartes to Aristotle. "Instead of being the most concrete of realities, both matter and mind are highly abstract concepts, the product of the reflective intelligence working upon the data of immediate experience. There is given in individual experience only the perceiving subject and his objective world. This dualism does not correspond with the dualism of matter and mind." The complete phenomena of life are shown only by individuals or organized unities. Moreover, "all living things pass through a cycle of activity which normally comprises development, reproduction, and senescent processes leading to death. The life-cycle is in each species a definite one, passing through a clearly defined trajectory, admitting of little deviation from normality." The behaviour of a living thing is, therefore, the activity of the organism "as an intact and unitary whole," and is directed towards an end, the completion of the normal life-cycle. This directiveness need not be consciously purposive, but it shows a certain measure of adaptability, and often the power of learning and profiting by experience. The "plain tale" of animal behaviour, as Professor Lloyd Morgan has recently called it, must start by direct observation of the animal in its natural surroundings, and should be continued in experimental conditions which approximate as nearly as possible to the normal; and the whole life-cycle of activity, not merely isolated parts of it, must be regarded as the primary thing. Analysis is justifiable and useful but lets slip the essential thing, the continuity and directness of actions taken as a whole. "A very great part of the behaviour of animals is response to needs (or deviations from normal) and not to direct external stimulation. . . . A good deal of what ranks nowadays as experimental biology is not biology at all, but physico-chemical research carried out on organic systems with complete disregard for the distinctive characteristics of such systems." Similarly, Dr. Russell points out, though we cannot know exactly what the quality of an animal's perception is, its response is not usually to separate physico-chemical stimuli, but to the perceptual field as a whole or to relations, patterns, or general images. This method for the study of animal behaviour is likely to be the method of the future and must have very important reactions not only upon the relation of biology to medical education, but even upon the teaching of human physiology.

MEDICAL TERMINOLOGY, INTERNATIONAL AND NATIONAL

A correspondent of the *Münchener medizinische Wochenschrift*,[1] after a passing reference to the present precarious position, in the school curriculum, of the study of Latin—already eliminated in some of the countries speaking a Latin-derived language, and in others threatened because of its alleged uselessness in comparison with the time taken up by its study—alludes wistfully to the happy position enjoyed, in the Middle Ages, by the possessor of a working knowledge of the Roman tongue. For this reason, rather than for the stock reasons which are put forward for the retention of instruction in Latin—the intellectual exercise, the enlargement of the intellectual horizon, the assistance given in mastering modern languages of Latin derivation—the writer is all for keeping Latin teaching alive. Possessing eight modern languages, he nevertheless finds it impossible to read a large proportion of modern scientific literature. Three or four centuries ago all that was of value would have been accessible to him after the learning of one foreign tongue only; but scientific literature, unfortunately, becomes nowadays less cosmopolitan and more "nationalistic." The nationalist quality of terminology in German medical literature has indeed become a source of difficulty not only to the investigator who seeks to refer to the work, often most valuable, of German authorities in similar fields, and to the medical journalist in particular, but also, as it would appear from a note in the same issue of the *Wochenschrift* by Professor Enderlen of Stuttgart, to the German medical man himself. Enderlen, reading a review of a surgical treatise, noted four "Verdeutschungen" which left him—a good German, as he says—in doubt concerning

[1] Chevalier Jackson and Chevalier Laurance Jackson: *Arch. of Otolaryngol.*, June, 1932, xv, 860.

[1] February 16th, 1934, p. 256.

the meaning of these " Germanizations " of anatomical (classical) terms. Further, as he slyly remarks, a reference to a German-French dictionary convinced him that a French medical reader would be equally at sea. The retention of Graeco-Latin forms of nomenclature is therefore recommended, as simplifying international, and even also national, understanding. In an appended note the editor of our contemporary lends the weight of his authority to the retention of classical terminology. Nevertheless, he is against the incorporation, in German medical literature, of a jargon of new foreign terms from contemporary foreign literature: if noteworthy, he thinks, they deserve translation into good German. He would even purge his country's archives of the French or English terms, such as " défense musculaire " or " missed abortion," which have already crept in and been accorded general understanding. It is with some regret, it would seem, that he rejects as Utopian the counsel that we should revert to Latin as the universal language of medical science: thus we might at once make the world-literature accessible at its sources to the educated person, and exclude from it the uneducated laity.

RED CROSS AND ST. JOHN

A wide range of activities is reviewed in the report for 1933 of the Joint Council of the Order of the Hospital of St. John of Jerusalem and the British Red Cross Society. Through the auxiliary hospitals for officers department, assistance was given to 256 officers, of whom eighty-one were new cases ; 18,402 have now been helped since 1914. As in recent years tuberculosis was responsible for a large proportion of the claims, but relief was also afforded to surgical, medical, and convalescent patients by admitting them to the hospital at Brighton. Ministry of Pensions patients are received on payment ; others contribute towards their maintenance, while some who are destitute are admitted free of charge. Help has also been given to ex-officers who, while able to trace their illness to war service, cannot produce a continuous medical history which would establish their claim on the Ministry of Pensions. The cases now dealt with are usually in more advanced stages than has been usual hitherto, by reason of the prevalence of ill-health, failing employment, and insufficient food. Another department, the central bureau of hospital information, has been very active. Eleven memorandums have appeared relating to such subjects as accommodation for paying or private patients, financial arrangements for orthopaedic patients, the medical staffs of small general hospitals, particulars of consumption and cost of water supplies, and the provision of hospitals with milk. The 1933 edition of the now well-known *Hospitals Year Book* won general approval as a compendium of useful information about the various sides of hospital administration. The committee in charge of comforts, ward industries, and stores made 275 grants in response to applications from Ministry of Pensions hospitals and other institutions ; about 450 men were enabled thus to receive training in handicrafts. Conveyance to entertainments was arranged for over 9,000 patients ; since 1920 well over a quarter of a million have had transport without a single accident. The Emergency Help Committee has assisted 12,725 cases. Refunds of loans amounted to £4,440 ; the total repayments since the inception of this scheme total £137,895—a sum sufficient to maintain this work on its present basis for more than two years. The home service ambulance committee reports that 120,343 patients were carried in the twelve months, some being invalids requiring treatment and others accident cases. There are now in the country 153 ambulances equipped by the committee, and 169 other ambulances affiliated to the service. Last year gifts were made of 157,000 books, 82,000 magazines, and 250,000 newspapers. Yet the demand by institution libraries grows greater still, and further gifts of this kind will be welcome.

THE GUTTADIAPHOT

Tests involving the examination of the blood in tuberculous patients are increasing in number, if not always in usefulness. The somewhat barbaric-sounding term of " guttadiaphot," signifying " the picture of a drop in transmitted light," cloaks a method of capillary analysis first introduced in Germany by Meyer, Bierast, and Schilling, and consists in placing drops of the patient's blood on specially prepared strips of blotting paper (divided into red, green, and blue squares), and examining the stains so obtained some hours later by direct and transmitted light. Certain features of colouring, outline, and consistency are found to be associated with abnormalities of the blood in systemic diseases. Piechaud, Dutrénit, and Guibert[1] give a very extensive account of the history, theoretical basis, technique, and applications of this method, with special reference to tuberculosis. If certain precautions in the carrying out of the test are taken, the interpretation of the pictures obtained offers no difficulty with a little practice. The test is considered particularly useful in anaemic conditions, and is stated to be more sensitive than the Wassermann reaction, especially in treated cases. In pulmonary tuberculosis the results do not appear to be clear-cut or very helpful, but the authors found a direct relation between the results of the test and the temperature curve, and an even more striking one with the sedimentation rate. The positive results obtained are not entirely accounted for by the anaemia often found in consumptives. The test is recommended as a simple and ready means of detecting that " something is wrong " for the practitioner " in the country " to whom more complicated methods of examination are not easily available. A bibliography consisting of some fifty-five references is added.

At a medical meeting at Frankfurt a/M, held from September 2nd to 9th, under the presidency of Professor W. Kolle, the Paul Ehrlich gold medal was awarded to Dr. Walter Kikuth. At the age of 38 Dr. Kikuth has succeeded in performing an enormous amount of useful work culminating in chemotherapeutic discoveries of great importance. Atebrin and its specific action upon the malaria parasites, especially the subtertian form, was worked out by him by comparative studies on the malaria-like parasites of the canary and the Java sparrow. Dr. Kikuth is now the head of the chemotherapeutic department of the I. G. Farbenindustrie at Elberfeld in succession to the late Dr. Roehl. He is also attached in an honorary position to the Medical Academy at Düsseldorf. Dr. Kikuth was born in Russian territory at Riga and, after commencing his studies at Dorpat, he was able to complete them in Germany after the Russian revolution.

[1] *Journ. de Méd. de Bordeaux*, June 30th, 1934, p. 485.

THE BRITISH ASSOCIATION

ANNUAL MEETING IN ABERDEEN

The 103rd annual meeting of the British Association for the Advancement of Science was held in Aberdeen from September 5th to 12th under the presidency of Sir James Jeans, who had been elected to the post left vacant by the death of Sir William Hardy. The Association had previously met in Aberdeen in 1859, when the late Prince Consort presided, and in 1885 under the presidency of Sir Lyon Playfair. A message from the King expressed his confidence that the investigation of the manifold problems confronting present-day scientists would continue to be productive of results which would benefit mankind. Professor W. W. Watts was elected to preside over the Norwich meeting next year.

PRESIDENTIAL ADDRESS

Sir James Jeans commented on the amazing changes in outlook which had occurred in the full half-century that had elapsed since the presidential chair had last been occupied by a theoretical physicist in the person of the late Lord Rayleigh, and compared the department of theoretical physics to a building brought down in ruins by a series of earthquakes. New facts of observation had wrecked previous conceptions, which were founded not upon the solid rock of ascertained fact but upon the shifting sands of conjecture and speculation. The fundamental mistake of the old-time physicist was that he had failed to distinguish between the half-truths of parables and the exact truth. Physical science obtained its knowledge of the external world by a series of exact measurements, or, more precisely, by comparisons of measurements. Knowledge of the external world must thus always consist of numbers and the synthesis of this knowledge be mathematical in form. The modern physicist accepted this implication, and distinguished between observable facts and pictorial parables. Space and time could no longer be classified as realities of Nature, and the generalized theory of relativity showed that the same was true of their product—the space-time continuum. This had destroyed the Newtonian conception of a rigid universe and the derived doctrine of mechanistic determinism. Modern theoretical physics set before itself the modest task of reducing to law and order the impressions which the universe made on the human senses. It was concerned with appearances rather than with reality, and the task of the physicist resembled that of the map-maker rather than that of the geologist or mining engineer. Theoretical physics had produced two maps—the particle-picture and the wave-picture. The first was a materialistic picture, catering for those who liked to see their universe mapped out as matter existing in space and time. The wave-picture had a determinist character, catering for those who asked the question: "What is going to happen next?"

After elaborating this point, Sir James Jeans came to what he termed the central and most surprising fact of the whole situation, which he thought would lead to most surprising changes in the views held of the universe as well as of the human race. The modern conception that a system of waves best depicted in a graphic form the knowledge gained of the constituents of the universe had revealed the central fact that this wave-parable had shown these waves to be Nature itself. The Nature studied was not objective, consisting of something perceived, but was rather the perceptions themselves. There was no clear-cut distinction between subject and object: they formed an indivisible whole which now became Nature. In the old physics the perceiving mind was a spectator merely; in the new physics it was an actor: the perceiver and perceived were interacting parts of a single system. The old physics seemed to indicate that personal ideas of free will were erroneous, and that freedom was an illusion; the new physics implied that this might not be so, and that it was possible to mould events to human desires and to live lives of emotion, intellect, and endeavour. Both materialism and matter needed to be re-defined in the light of the new knowledge. The full-blooded matter and the forbidding materialism of the Victorian scientist had given place to a movement in the direction of philosophic idealism. Mind and matter, if not proved to be of similar nature, had at least been found to be ingredients of one single system. There was no longer room for the kind of dualism which had haunted philosophy since the days of Descartes. Photons were no longer to be regarded as single individuals each going its own way, but as members of a single organization or whole—a beam of light. Biologists were beginning to state, though not very unanimously, that the same might be true of the cells of the body. It was conceivable also that the same might be true of the perceiving minds, and so human individuals might form ingredients of a continuous stream of life, even though regarding themselves as obviously distinct persons when viewed in space and time.

Defending scientific progress against the charge of causing unemployment in industry and wars, Sir James Jeans said that it was obvious that a country which fell behind in such advance would soon also fall behind in its industries, its economic position, its naval and military defences, and its culture. Labour-saving devices and what was termed pure science might ultimately lead to new trades and new popular demands, providing employment for vast armies of labour. A balance must be maintained, however; for a steady flow of lavour-saving devices, with no accompanying flow of new industries to absorb the labour thus displaced, could only lead to unemployment and chaos in the field of labour. At present the want of balance tended towards unemployment, and the great need of the moment was for industry-making devices. Employment for millions of men had been provided by Faraday's electro-magnetic induction, Maxwell's Hertzian waves, and the Otto cycle, while the economic value of one scientist alone, Edison, had been estimated at three thousand million pounds. Unhappily, no amount of planning could arrange a perfect balance, but the throttling down of science would only crystallize the community in its present state with nothing to do but to watch its population increase, and shiver as it waited for the famine, pestilence, or war which must inevitably come to restore the balance between food and mouths, and land and population. Was it not, therefore, better to press on efforts to secure more wealth, leisure, and dignity of life for our own and for future generations, even though risking glorious failure, than to accept inglorious failure by perpetuating the present conditions in which these advantages were the exception rather than the rule?

HARDY MEMORIAL LECTURE

Sir Frank Smith, Secretary of the Department of Scientific and Industrial Research, paid a warm tribute to the work performed on behalf of the Department by Sir William Hardy in the last seventeen years of his life with special respect to the research into the transport and storage of foodstuffs. He described the way in which the Department's Torry Research Station at Aberdeen, founded by Sir William, was likely to help the fishing industry to regain its prosperity. The recent report of the Sea Fish Commission had stressed the highly perishable nature of the herring. Those caught more than twenty-four hours before landing were known in the trade as "overdays," and were inferior in quality—a fact which led to the important industry of kippering, and partly explained why the kipper was the most popular form of herring with the public. The fish was smoked nowadays, as heretofore, over smouldering fires of sawdust, a process which was at the mercy of the weather, and depended largely on the craftsmanship of the smoker, the antiseptic substances in the smoke, the range of temperature, and the dampness of the drying atmosphere. Each of these variables had been separately investigated at the Torry Research Station, and a new type of smoking kiln had been designed to control them. With its aid any desired type of cure could be produced with certainty. Home waters were unable to cope with the demands of the market for good white fish, such as cod, halibut, and plaice, though there were now about 1,600 trawlers fishing from British ports and landing each year nearly 1,700,000

tons of fish. Far too large a proportion of the fish landed was stale. Mere chilling in crushed ice was ineffective, but the Research Station had found a possible way out in the form of freezing the fish in cold brine at a temperature of −20° C. The growth of bacteria was thus completely arrested, and if the fish was stored at this temperature it would keep perfectly fresh for three months.

Sir Frank Smith discussed the immense progress made in the science of refrigerating foods during the last fifty years. Thanks largely to the work of Sir William Hardy, it was now recognized that the biologist should formulate the conditions required for the satisfactory storage of various forms of foodstuffs, and that the engineer should then provide these conditions. In the case of meat, for example, deterioration was due to enzymes or organisms naturally present in the meat itself, and secondly to the growth of moulds and external bacteria. The first could be entirely prevented by cold, but the second depended on the initial contamination to which the meat had been exposed, unsaleability resulting when the bacterial population reached a density of over 30 million organisms in each square centimetre. The importance of cleanliness was therefore manifest, for freezing produced changes which were likely to damage the meat. This risk was negligible in the case of mutton, lamb, and pork, but rendered freezing as distinct from chilling unsatisfactory for beef. The work at the Department's Low Temperature Research Station had shown that at temperatures near freezing point a concentration of 10 to 20 per cent. of carbon dioxide so delayed the growth of micro-organisms as to double the life of the beef. Hardy and his colleagues had found that different kinds of fruit exhibited idiosyncrasies as regards preservation. It was largely the intolerance for cold shown by the British apple which accounted for the fact that for about nine months of the year the table apples in this country came from over-seas, although some of these were gathered at the same time as the home-grown apples. Sir William Hardy had solved this problem by storing the fruit in a definite percentage of carbon dioxide, while the temperature of the store was kept well above freezing point. This discovery had opened a new era in the storage of English apples, and there were to-day thirty-two such gas stores in this country with a total capacity of 7,000 tons. The rate at which these were being erected was rapidly increasing. The brilliant work which Hardy had inaugurated and directed had been of enormous advantage already, and it was still extending.

COLOUR VISION

Professor H. E. Roaf, president of the Section of Physiology, in an address on normal and abnormal colour vision, discussed the validity of the trichromatic hypothesis, the nature of the departures from colour vision in those with colour-blindness, and the nature of the colour-perceiving mechanism. He said that if it was to be taken as true that three types of sensory mechanism were sufficient to account for colour vision one of the four colours red, yellow, green, and blue must be due to stimulation of at least two of the other ones. For several reasons yellow had been chosen as the heterogeneous one. Experimental evidence was forthcoming that a red stimulus to one eye and a green to the other gave a sensation of yellow, this result being obtained even with lights from the spectrum. Since the unitary sensations yellow, white, and black could be built up from stimuli associated with other sensations, it was possible to reduce the number of data for colour perception to three, and there was no real objection to the trichromatic explanation of colour vision proposed by Thomas Young. Abnormal colour vision might be congenital or acquired ; the usual form was congenital, and did not alter through life. The defect seemed to consist in a decrease in the ability to distinguish red from green, and the patients (hypochromats) distinguished fewer colours than the normal (euchromats). They were often described as having blue-yellow vision, or of distinguishing in the spectrum blue from not blue, whereas the normal person subdivided the not blue into red and green. Since yellow occupied the region between red and green, the defect was most noticeable in the yellow region of the spectrum, especially in the milder degrees of the defect. The hypochromat seemed to have only two types of colour receptor organs, whereas the normal person had three. The threshold for light was not necessarily altered, and it was possible for hypochromats to see clearly through a filter which only permitted the passage of the red end of the spectrum. In fact, a hypochromat who could not see red geraniums among green leaves could distinguish the flowers as light objects against a dark background when looking through a red glass filter.

Professor Roaf thought that the trichromatic hypothesis implied, as stated by Young, the presence of three types of receptors linked with three groups of nerve fibres in the optic nerves. It did not seem likely that there were three photo-active substances which were acted on by the long, medium, and short wave-lengths of the visible spectrum ; only one photo-active substance, rhodopsin or visual purple, had as yet been found. Professor Roaf added that his own work had led him to believe that the types of receptors which were stimulated by visible radiation were as follows: (1) one which was stimulated by all parts of the visible spectrum, and gave rise to a sensation of violet when stimulated strongly by itself ; (2) one concerned with the not-blue aspect of vision of the hypochromat ; and (3) one which functioned in normal vision, distinguishing red from not red. In some persons the activity of one of these types was reduced or absent, giving rise to varying degrees of defective colour vision.

NUTRITION AND DISEASE

In the Section of Physiology Professor L. S. P. Davidson read a paper on nutrition in relation to anaemia, and a joint symposium was also held with the Section of Agriculture on nutrition in relation to disease generally. Professor Davidson pointed out that in the last ten years there had been an unparalleled advance in knowledge regarding the relation of diet to blood formation. This had been the means of eliminating certain forms of anaemia completely, of bringing under therapeutic control others which were incurable, and of directing attention to others which had previously escaped notice. Before 1926 every patient with pernicious anaemia had died. To-day it was known that the essential cause lay in a failure of gastric secretion which prevented the patient obtaining from his food a principle which was essential for normal blood formation. Successful liver therapy had ensued. Of greater economic importance, owing to its great frequency, was the group of nutritional anaemias due to iron deficiency. Approximately 50 per cent. of infants and adult women of the poorest classes were anaemic. The principal factors were: (1) pregnancy, and loss of blood at the menstrual periods, leading to increased demands for iron ; and (2) an iron-poor diet which failed to maintain adequate reserves to meet such eventualities. Dietetic therapy and the administration of iron salts rapidly and cheaply brought about a remarkable improvement in health, with a corresponding gain in economic efficiency and resistance to disease.

In the symposium Dr. J. B. Orr said that recent investigations had indicated that nutrition as determined by diet was now probably the most important factor affecting the health of the community. He suggested that the present generally accepted standards of health were too low. If the necessary measures could be taken to ensure that every member of the community had a diet which was fully adequate for health, the next generation would be endowed with a better physique, and be freed from much of the disease and indefinite ill-health which afflicted the present generation.

Professor J. J. R. Macleod said that the discovery of deficiency diseases had made great strides, but the most important problem awaiting elucidation was to determine to what extent more general diseases in man might be similarly related to nutrition. There was evidence that diabetes, anaemia, and goitre were nutritional diseases, and probably other maladies were attributable to faulty dietetic habits.

Dr. May Mellanby remarked that, as regards dental caries, which was almost universal in civilized countries,

a new outlook had emerged during the last fifteen years. Faulty nutrition, especially in early life, was the cause of defective structure, which in its turn predisposed towards caries. To ensure good structural development the diet of the mother during pregnancy and lactation, and of the child after weaning, must include abundant calcium and phosphorus, and the specific calcifying factor vitamin D. Cereals contained anti-calcifying toxamines; their consumption must therefore be limited. Vitamin D helped to prevent and arrest caries even in imperfect teeth. Beautiful teeth, almost free from caries, were found in Eskimos (who obtained their vitamin D from blubber) and in the natives of the Tropics, in whom breast-feeding was prolonged, and vitamin D was gained by exposure of the whole body, especially while young, to the ultra-violet rays of the sun. With the adoption of the diet and clothes of civilization the teeth of these peoples deteriorated rapidly, so heredity was not a fundamental factor. The incidence of pyorrhoea could be reduced by giving abundant vitamin A, especially during the earlier years of life, in the form of liver oil and green vegetables.

Professor S. J. Cowell enlarged on the vicious circle in which malnutrition due to faulty feeding led to disease, and disease in its turn to imperfect nutrition. Deficiencies exerting their effects in early life might lead to faulty development of tissues which could not later be restored to health, thus predisposing to disease in later life. Other diseases might result from some inherent or acquired incapacity of the body to deal in the normal way with essential food factors actually supplied in the diet. When it was remembered that foods in common use might be sources of positively harmful substances, as well as be deficient in beneficial substances, it was obvious that the construction of ideal diets required greater knowledge than was at present available.

Reviewing nutrition in relation to diseases of the larger domesticated animals, Dr. H. H. Green stated that vitamin deficiencies were rare, but mineral deficiencies were of enormous economic importance throughout the world. On millions of acres of grazing land throughout the Empire the mineral content of the pasture, most commonly the phosphorus content, was the limiting factor in stock-raising. Special attention was drawn to the different physiological reactions of different species of animal to the same type of dietary deficiency, and to the different aetiologies of diseases which presented the same pathological picture. Thus the bovine species developed rickets and osteomalacia on certain pastures on which the equine species remained immune. Cattle, sheep, and horses remained in good health for years on a ration which would induce scurvy in a guinea-pig in a month. Health or disease was thus not only a question of the composition of the ration, but also of the species of the animal, and perhaps of the number of generations over which the rationing extended.

Dr. D. Robertson reported experiments which revealed the influence of nutrition on helminth infestations of animals, and indicated possibilities of reducing the consequent losses. Evidence that the degree of parasitic infestation in lambs had a direct bearing on the nutritional state of the animal had been obtained as the result of a survey in Scotland. Experiments performed at the Rowett Institute on the effect of nutrition on the susceptibility of sheep to worm invasion were described, and the total evidence that the nutritional condition of an animal was closely related to its susceptibility to helminthic infections was summarized.

(To be concluded)

The annual report for 1932 of the Native Affairs Department of Kenya Colony and Protectorate has just been issued by H.M. Stationery Office, price 3s. (postage extra). The chapter on medical matters and public health occupies eighteen pages, and gives in summary an account of the work of the medical department among the natives. There is also an appendix outlining in tabular form a health scheme for native reserves with hospitalization on the basis of one bed per thousand of population.

THE BALANCE SHEET OF THE VOLUNTARY HOSPITALS

If Mr. Micawber's traditional remark holds good, the voluntary hospitals of this country should be in a state of happiness. *The Hospitals Year-Book*[1] sums up in three figures the position of voluntary hospital finance for 1932 (the latest year for which complete returns are available). In that year the hospitals of Great Britain and Ireland received £15,258,897, and spent £14,512,800, leaving a surplus of nearly three-quarters of a million. The Scottish hospitals had the lion's share of the surplus —namely, £287,000—but those of London had nearly as much (£263,000). It has sometimes been said by hospitals that a debt is an asset, but it now appears that the belief in the appeal value of an adverse balance is dying out. Hospital chairmen at their annual meetings express thankfulness that the year has ended with something to the good, and wealthy people—or, let us say, people belonging to the contributing classes—are now more inclined to give to hospitals which budget ahead and cut their coats according to their cloth. Of prudent Scotland's 105 hospitals only twenty-nine ended the year with a deficit.

Another gratifying feature of the hospital position is the steadiness of voluntary giving. In London the voluntary gifts per available bed worked out at £83, an increase of £3 on the year. Patients' contributions rise from year to year, and in the year under review represented £68 per available bed. Public services, interest on investments, and extraordinary income brought up the total amount received per available bed in London to £235. These figures also hold good, more or less, for the special group of London teaching hospitals, except that here the total income per bed was £282, the increase being accounted for almost wholly by the larger income on investments. In the rest of Great Britain and Ireland voluntary gifts accounted for about £65 per available bed and patients' contributions for £24. The 158 hospitals in London received just over half a million in legacies in 1932.

MAINTENANCE COSTS

On the other side of the ledger the cost per bed of maintenance in London—the cost of the out-patient department being included in all these computations—was £228, of which salaries and wages accounted for £85, domestic expenditure (furniture, bedding, laundry, fuel, and light) for £38, provisions for £32, and surgery and dispensary (drugs, dressings, instruments, and so forth) for £27. In the English provinces the cost of maintenance was £132 per bed, in Scotland £121, and in Ireland £90. Curious variations appear in the weekly cost of in-patients, even in so uniform a group as the twelve teaching hospitals of London. At the London Hospital the average weekly cost is just over £5; at University College Hospital only £3 5s. If we take the provincial hospitals with medical schools, we find that at Manchester Royal Infirmary, where the figures are the highest, the cost is £3 10s., and at Sheffield Royal Infirmary only just over two guineas.

Some interesting conclusions may be drawn from the costs for voluntary and municipal hospitals respectively. In the general hospitals of the L.C.C. the average cost per in-patient per week varies from £4 14s. at Mile End to £2 12s. at Lambeth, and, among municipal hospitals in the provinces, from £3 10s. at Selly Oak, Birmingham, to £1 11s. at Newcastle-upon-Tyne—institutions comparable both in respect to number of beds and to staff.

NUMBERS OF PATIENTS

From these well-marshalled figures we get an impressive picture of the hospital population. In the 973 hospitals giving details the number of new in-patients in 1932 was 1,206,789, and of new out-patients 5,387,888. One in four of the in-patients and more than one in three of the out-patients were at hospitals associated with medical

[1] *The Hospitals Year-Book, 1934.* London: Central Bureau of Hospital Information, 12, Grosvenor Crescent, S.W.1.

schools. As yet there seems to be no definite movement one way or the other to show the effect of the recent consideration that has been given to the true function of the out-patient department. Reference is made to the movement for more pay-bed accommodation, and a short list is included of about a score of contributory schemes for paying or private wards, of which that of the British Provident Association is the most important, aiming to provide, by means of insurance, cover sufficient to meet hospital charges, with proper remuneration for the doctor. Other useful information concerns the manner in which about one hundred small general hospitals—no doubt representative—appoint their medical staffs. So far as their general wards are concerned, seventy-three of these have a restricted honorary medical staff, in which appointments are limited in number and candidates have to submit themselves for election ; in eighteen others any practitioner in the area is eligible for membership of the staff ; in five the senior posts are filled by visiting specialists (not local practitioners), but any practitioner in the area is eligible for membership of the staff, and in seven there is partial restriction—that is to say, residence within a defined area, but no restriction in number of staff appointed. Information as to their private wards is afforded by fifty-two of these hospitals. In twenty-four, although there may be restrictions in the general wards, any practitioner in the area served is at liberty to treat his own patients in the private wards, and in the other twenty-eight the same conditions apply in the private as in the general wards.

GENERAL INFORMATION

A word should be said about the encyclopaedic character of this publication. If it is desired to know how many hospitals possess their own laundries, what the experience is with regard to the efficiency of synchronized clocks, how much hospitals pay for their milk, what methods are favoured for the disinfection of wards, how food is commonly conveyed from kitchens, the number of times the lighting of operating theatres failed at certain hospitals, the steps taken to prevent cripples from slipping on hospital floors, the conditions governing the use of the premises of hospital supplies of radium, the bill for replacements of broken crockery, the weekly wage of hospital porters, the incidence of tuberculosis among nurses, the dates of foundation of the various hospitals, or particulars of the fourteen British hospitals on the Continent—these and a thousand other details are readily obtainable.

India

Pasteur Institutes

In the absence of any compendium of reports on the Pasteur Institutes of India it is excusable, though regrettable, that recognition of the excellent work therein accomplished year by year is not more widespread. The annual reports of some reach England from time to time, but mention of the activities of others is only to be found in the reports of Government medical officers, which are often very belated. The report has recently been received for 1932-3 of the Institute at Kasauli, which, with its various subsidiary centres, dealt with 15,118 patients in the twelve months, an increase of nearly 3,000 on the previous year. The period under review is regarded as being especially important, since it was the first in which the results accruing from researches covering several years could be given a practical therapeutical trial. It had been shown that large doses of antirabic vaccine were superior to small ones in preventing rabies, and that, as found elsewhere, the Paris strain of rabies-fixed virus had better antigenic value than the Indian strain. Consequently during 1932 the Paris virus alone was used in manufacturing vaccine, and a scale of dosage was devised which ensured a much higher average dose of vaccine for each patient than had previously been in use. The result was that the total number of deaths from hydrophobia was over 27 per cent. less than in any previous year since comparative statistics were available, and this in spite of the fact that the number of patients coming for treatment was much greater, indicating a distinct advance in the method of treatment. There were no cases of post-treatment paralysis. The annual report for 1932 of the director of the Pasteur Institute of Southern India at Coonoor is published with the twenty-sixth annual report of the Central Committee of the Association. Here also there has been a profitable decentralization of treatment throughout the Madras Presidency, the States of Mysore, Travancore, Cochin, and Pudukottah, and the Nizam's dominions. The daily attendance at the Central Institute has fallen, therefore, the figure for the year being 566. Three of these patients died from hydrophobia after a complete course of treatment and one during it, the mortality rate being 0.7 per cent. The Paris-fixed virus was in use throughout the year. Antirabic virus was issued for 10,350 patients in the various centres ; there were thirty-four deaths, and a mortality rate of 0.38 per cent., the lowest mortality rate on record at this institute, the decline being tentatively attributed to the use of the Paris virus, with the proviso that definite conclusions cannot certainly be drawn yet. During the twenty-eight years of existence of the Coonoor Institute 34,827 patients have been treated there, with a total mortality rate of 1.11 per cent. The success of the antirabic treatment is indicated by the steady increase in the demand for supplies. The Coonoor Institute serves 107 centres in charge of medical officers specially trained in this therapy, and courses of instruction, lasting seven consecutive days, are held from time to time. Particular stress is laid in these courses upon the practical side of the work, with the result that the difficulties in looking after so many out-centres, and especially in securing accurate statistics, have been greatly minimized. Reference to the work of the Pasteur Institute at Patna and the antirabic centre at Cuttack appears in the annual return for 1932 of the civil hospitals and dispensaries in Bihar and Orissa, which has been prepared by Colonel L. Cook, I.M.S., inspector-general of these hospitals. An arrangement has been effected with the Patna city municipality to provide suitable accommodation near the Institute for patients and their relatives coming for antirabic treatment. The vaccine can also be supplied by civil surgeons on requisition for patients not attending the Institute. During the year under review 4,112 patients attended at the Patna Institute, as compared with 3,626 in the previous year. The corresponding figures for the Cuttack centre were 366 and 287.

Medical Training of Women in the Punjab

In the annual report for 1932 on the working of hospitals and dispensaries in the Punjab, Colonel D. P. Goil, Inspector-General of Civil Hospitals, states that the number of girls seeking admission to medical colleges and schools is rapidly increasing. The accommodation in the existing institutions is very limited, and many candidates have to be rejected. It has for some time been proposed to establish a separate medical school for women at Lahore, but so far no steps have been taken. The Punjab Medical School for Women, with which is incorporated the Women's Christian Medical College for Women at Ludhiana, was hitherto the only institution on which

the Province depended for its supply of women doctors required for the charge of hospitals and dispensaries for women. To meet the growing demand among women for medical education of the degree standard, the system of co-education was introduced by the King Edward Medical College in Lahore in 1929, and extended to the Amritsar medical school in 1932. Up to ten places are reserved annually for women students in the former, and at the latter school the number has now been raised from ten to fifteen. The co-education system is reported to be working well. A large number of Punjab students are being trained in the Lady Hardinge Medical College at Delhi. In the year under review a noteworthy feature was the provincializing of the Lady Aitchison Hospital at Lahore. In Attock the Anant Ram Zenana Hospital was opened at Tallagang; the women's section of the Campbellpur civil hospital was placed in charge of a woman sub-assistant surgeon, and a travelling woman assistant surgeon was appointed for the district. In the Province there are now forty-four separate hospitals for women, and twenty-one sections for women in other hospitals, with women doctors attached to them. It is regretted, however, that the scheme for the provision of a women's hospital under a woman assistant surgeon at every district headquarters, and of a section for women at most of the tahsil headquarters hospitals, under a woman sub-assistant surgeon, is unlikely to be realized for a very long time, owing to the financial situation. Special efforts are being made to increase the number of Indian hospital nurses and of trained midwives, particularly in rural areas. In 1932, moreover, an Act was passed to provide for the registration and training of nurses, health visitors, midwives, and dais, and incorporating a Nurses Registration Council. The Punjab Central Midwives Board continued to supervise the training and examination of midwives, whose number is steadily growing.

Bombay Plague Epidemics

In 1932 there was a sharp increase in the plague mortality rate in the Presidency of Bombay, and this circumstance has caused Major A. Y. Dabholkar, I.M.S., Officiating Director of Public Health, to discuss recent epidemics of this disease in the course of his report on that year, which was otherwise a very healthy one, apart from a rise in small-pox. Since 1917, the year in which the highest mortality (162,874) was registered, plague has been decreasing in the Presidency, progressively on the whole, but showing well-marked exacerbations in certain years. In 1923 the deaths were 33,741, but in 1930 they had fallen to 5,026, and in 1931 to 3,506, so that the rise in 1932 to 14,446 was hardly expected, although it was generally thought that there might be some increase. The worst affected district was Belgaum, with a death rate of 4.38 per 1,000 of population, and followed by Satara, with a corresponding rate of 3.09. Sind escaped entirely, and Gujarat, with the exception of Surat and Kaira, was almost free. In the southern registration district, where the heaviest mortality occurred, the epidemic curve began to rise in August, 1931; steadily increased until January, 1932, with an uninterrupted fall in the ensuing four months; rose from June onwards; and reached a peak in December. The curve followed the usual course, the off season for plague in this district generally covering April, May, and June. Rat destruction campaigns were actively conducted. A significant indication of their value came from Bulsar in the northern registration district, where rat destruction was continued into 1933. At the time of reporting in that year there had been no outbreak of plague in that town, hitherto much affected, or in any of the neighbouring villages, although the time for its expected recrudescence was then coming to an end. To combat the epidemic eleven medical officers were appointed on plague inoculation duty in the Presidency. The total number of persons inoculated in 1932 was 417,657, as compared with 112,025 in the previous year. Medical officers in charge of hospitals and dispensaries as well as private practitioners co-operated actively in the campaign. A statistical table of the number of deaths from plague since 1911 is given in the report. In the first year the figure exceeded 100,000, and it is apparent that this disease is gradually being brought under control, despite the occurrence of occasional epidemics, the mortality in which is definitely diminishing. Figures are also given showing the immunity conferred by inoculation, the popularity of which is increasing with the spread of knowledge. The destruction of rats is being energetically pursued. Of sixteen examined in Bulsar eight were found to be infected, whereas in Bombay City only 691 were infected out of 272,230 examined.

England and Wales

Queen's Institute of District Nursing

A statistical report has been compiled of the midwifery cases undertaken by Queen's nurses and village nurse-midwives working in connexion with the Queen's Institute of District Nursing during 1933. The former numbered 1,000, an increase of fifty-one, and the latter 2,855, an increase of forty-one. A total of 64,144 cases were attended; this represents a decrease on last year's total, but it is partly accounted for by the fact that particulars of cases in Cumberland are not yet available; these were about 900 last year. Medical aid for the mother was sent for in 31.5 per cent. of the cases and in 5.4 for the infant. There were 4,553 forceps cases, a percentage of 7.1. The number of maternal deaths was 145, of which thirty-eight, or 26.2 per cent., were primiparae, and thirty-eight had had five or more previous pregnancies. This mortality rate is 2.26 per 1,000, as compared with 2.1 in 1932 and 1.7 in 1931. The rate is 2.3 per 1,000 in urban districts and 2.2 in rural districts. These figures represent 58,946 cases in England, with a maternal mortality of 2.3 per 1,000, and 5,198 cases in Wales, with a maternal mortality of 1.9. The following table shows the causes of these deaths for the years 1933 and 1932.

	No. of Cases	1933	1932
		Per cent.	Per cent.
Sepsis	49	33.8	28.5
Accidents of labour...	37	25.5	29.2
Eclampsia	4	2.8	11.2
Embolism	20	13.8	6.3
Complications	35	24.1	24.3

Sepsis occurred in eighteen primiparae and in nine multiparae of five or more pregnancies, while accidents of labour numbered six in the former and fifteen in the latter. The percentage of primiparae in the series as a whole was 23.3. It is reported that ante-natal supervision continues to improve, although in many cases too few visits have been made during the last two months of pregnancy. Of the forty-nine deaths due to sepsis, seven occurred in forceps deliveries, in ten there was ruptured perineum, in six abortion had almost certainly been attempted, and four cases were infected by midwives. The thirty-seven accidents of labour comprised twenty-six of haemorrhage (including five cases of placenta

praevia, and seven of placental difficulty with manual removal in two instances), two cases of ruptured uterus, and nine of shock and cardiac failure. Cases of eclampsia declined from sixteen in 1932 to four in 1933, but there was a rise as regards embolism from nine to twenty. Of the embolism cases six had been delivered by forceps, five had histories of circulatory or cardiac troubles, and one patient was an alcoholic primipara. From several sources reports have been received of deaths caused by lowered vitality and lack of resistance to complications. The patients were not able to obtain sufficient nourishment during pregnancy, and some were living in overcrowded or otherwise unsatisfactory homes. In thirty-eight instances poverty-stricken homes were specifically mentioned. In one area it was stated to be difficult to obtain additional nourishment for expectant mothers on any but medical grounds, and it is submitted in the report that this should be available whenever the family income is insufficient to meet the added requirement of the mother during pregnancy. The number of maternity nursing cases (doctor engaged, midwife acting as maternity nurse) was 28,015, a decrease of 1,557 on the figure for 1932. There were 133 maternal deaths (4.7 per 1,000).

Health Work in Warwickshire

In a comparison of the more important statistical results for the year 1933 with those for the previous thirty years, Dr. Hamilton Wood, county medical officer of health for Warwickshire, points out that the birth rate for the year under review (13.71) is the lowest ever recorded in the county. He adds that if this fall continues, as it has done progressively since the high post-war rate of 1920, the time will soon be reached when the death rate, with its tendency to rise, will surpass it. The birth rate for England and Wales in 1933 was 14.4. There are nine ante-natal clinics at work in the county, but it is calculated that this service reaches only one out of every five expectant mothers who engage midwives for their confinement. Clinic provision would have to be doubled, therefore, to allow a substantial number of midwives' cases to have the advantage of medical ante-natal supervision. Since, however, there would still remain many expectant mothers in rural areas who would be unable to take advantage of this provision, Dr. Hamilton Wood considers that the question of introducing a domiciliary medical ante-natal scheme (as recommended in Memo. 156 of the Ministry of Health, 1930) might well be brought up. He remarks that a scheme of this kind is already operating in a number of county areas, and would appear to be the only practicable means of reaching the majority of expectant mothers engaging midwives for their confinements. Any such general practitioner service should not be in substitution for but in addition to the clinic facilities already provided in the more populous parts of the county. The county council has now in operation a scheme for compensating midwives in necessitous cases where the person engaging a midwife is unable to pay her fee, or where a midwife loses the whole or part of her fee in consequence of the patient's removal to hospital. It also provides compensation in cases where a midwife suffers financial loss as a result of suspension from practice owing to her being a possible source of infection. As regards rural water supplies, Dr. Hamilton Wood urges the importance of rural district councils discarding the parochial outlook and utilizing the resources of the district as a whole to fulfil a duty which in some cases has been sadly neglected for very many years. He adds that the financial side of the question should not be allowed to weigh too heavily against the advantages of a pure water supply, nor should the fact that a parish has a low rate of produce prejudice the rural district council in the fulfilment of its obligations.

The death rate from infectious diseases in 1933 was the lowest ever recorded, and no person died from typhoid fever. The pulmonary tuberculosis death rate rose slightly to 0.52, but the hope is expressed that this figure will fall in the next few years with improved housing conditions and better employment.

Ireland

Anthrax in a Slaughtered Cow

The medical superintendent officer of health, Dr. C. S. Thomson, in a report to the Public Health Committee, Belfast, illustrated the value of having only one abattoir in a city, and that one entirely under the municipality, with a fully qualified veterinary surgeon and staff in charge, supervised by the superintendent M.O.H. An animal was killed at Hillsborough, County Down, some twelve miles from Belfast, and was brought into the city to be sold to butchers for ordinary meat. The Belfast County Borough Council by-laws require that any meat brought into the city for that purpose must first be examined at the abattoir by the city veterinarian. On examination of this carcass the spleen was found to be somewhat enlarged. A smear was made, and the city veterinarian found that anthrax was present, although the carcass did not have the usual pathological signs of this condition. The carcass was burned, the meat inspectors were disinfected at the municipal disinfecting station, and all other necessary precautions were taken. Meanwhile, the city medical officer was informed that a man had been admitted from Hillsborough to the Royal Victoria Hospital with a malignant pustule, and investigation revealed that the patient was the man who had slaughtered the animal. The patient received prompt treatment and recovered. It is unnecessary to dwell upon the value of a system such as Dr. Thomson suggests.

Health of County Galway

In his annual report Dr. B. O'Beirne, county medical officer of health, states that 185 cases of diphtheria were notified in 1933, a decrease of six on last year's figures, the number of deaths being thirty-three, as against forty in the previous year. Fifty-nine cases are debited to the Galway urban area, although only eleven actually occurred there. The remaining cases were returned from the Galway Central Hospital, where the disease was endemic during the year, twenty-one being reported as "carriers." Efforts have been made to locate the source of the infection in this institution, and it now appears to be under control. The number of cases from the Galway rural district is high. This may be attributed to an outbreak in the Moycullen area, which became epidemic. As a result of investigation five "carriers" were discovered and isolated, and the outbreak was consequently checked. Tuam rural district has also a large number of cases, many of which occurred in the Abbey dispensary district; there are frequent occurrences of the disease in the Tuam districts. There have been no cases of typhus since 1930. Seventeen cases of enteric (or typhoid) fever were notified during the year—a reduction of four on last year's figures—with four deaths. There was no epidemic, the disease was sporadic, and in nearly all cases the source was attributed to the water supply. Ninety cases of scarlet fever were notified for 1933, as against 178 for 1932, and five deaths. Included in the sixteen cases debited to Galway urban area are two which were transferred from the general wards of the Central Hospital. Another case was that of a patient

from County Mayo, transferred from Bray, County Wicklow, where the disease was apparently contracted. Twelve cases of puerperal fever were reported in 1933, and twelve deaths. The six cases assigned to Galway urban area occurred in the maternity wards attached to the Central Hospital. Three cases of encephalitis lethargica were reported for the year under review, two being from the Galway urban area, and eighteen cases of erysipelas, four of which were transferred from the general wards of the Central Hospital. There is a disinfecting station, the property of the Board of Health, attached to the fever hospital, and a cleansing and disinfecting station, the property of the Galway Urban Council, at the docks. The latter is open to the general public, where baths, etc., are to be had for a small fee. There is a port sanitary authority and a port medical officer. In the case of the graver infectious diseases the ambulance takes the clothes to the fever hospital. A sack disinfector was purchased by the Board of Health with a view to having disinfection and disinfestation carried out on a large scale in outlying districts where there are epidemics of infectious diseases. The scheme, started in 1931, for active immunization against diphtheria is being continued in this county. In 1931 a total of 2,102 children received the full course of three injections, 1,206 in 1932, 1,607 in 1933, giving a gross total of 4,915. The reports from the various areas in which the scheme has been carried out have been most favourable.

County M.O.H. for Kilkenny

Commissioner P. J. Meghan, who is administering the business of the Kilkenny County Council, stated at a recent meeting that he had received a communication from the Local Government Department in reference to the appointment of a county medical officer of health. He said it was apparent, in view of the water supply and sewerage schemes in the different towns and villages in the county, and the housing surveys the Minister had requested, that a county medical officer was required. The question of school medical services was also of great importance. He proposed, therefore, to advertise for a temporary medical officer of health, at a remuneration of ten guineas a week with travelling expenses, to undertake the duties until such times as the Appointments Commissioners filled the permanent position. He had already made an order at the Board of Health regarding the new county school medical officer, so that 50 per cent. of the remuneration would be recouped from the grant for school medical services. With regard to the terms of the appointment, the Irish Medical Secretary wrote to the Commissioner pointing out that the temporary remuneration was altogether inadequate ; he expressed the opinion that no candidate with adequate experience of public health administration would apply for the post at the remuneration offered, and, in the circumstances, it would be better if the Commissioner did not proceed with the temporary appointment. The temporary remuneration offered was £546 per annum with travelling expenses, as compared with £800 and travelling expenses for the permanent post. The Commissioner has now decided not to proceed with the temporary appointment.

"Gas in Housing and Slum Clearance," an illustrated pamphlet produced by the British Commercial Gas Association, serves as a reminder that town planning and slum clearance must be allied with the provision of an efficient and economical fuel if they are to succeed in bringing a better standard of comfort into the life of the working-class family. The pamphlet (No. 244 of "A Thousand and One Uses for Gas") can be obtained free from the office of the association, 28, Grosvenor Gardens, S.W.1.

CORRESPONDENCE

Pregnancy Diagnosis Station

SIR,—From a letter sent out as from the Pregnancy Diagnosis Station here to those medical practitioners whom it has served in the past it would appear that the station is closing down in Edinburgh and is reopening in London.

Actually this is not so. It is the case that, to my great regret, Dr. Wiesner, to whom is due all the credit for the inception and successful development of the station, is leaving this Institute and is moving to London, where he intends to continue his diagnostic and advisory work. But during the past five years the station has come to represent much more than the personal activities of one man ; it has become a necessity to many practitioners, and though the man goes the service must continue. The laboratory here will not close down. At least it must continue to serve Edinburgh and the East of Scotland, and to do this it must serve a much wider area, for its efficiency must be largely determined by its size, and this must depend upon the number of clients. In efficient running, prompt reliable service, and low charges, several thousands of tests must be made annually. Its income must be sufficient to provide skilled medical supervision, an efficient technical staff, smooth routine, and, above all, sufficient data, for only then can the records possess any considerable scientific value. I have to hope, therefore, that this laboratory will be used by practitioners from all parts of Great Britain.

If the facts were better understood there would of course be room for more diagnostic laboratories than at present exist. It is irritating to recognize that even yet so very many practitioners either do not know that such a service exists in most of the larger cities, or, knowing, take no advantage of its existence. It should not be necessary to keep repeating that the tests now used yield an accuracy of not less than 97 per cent. ; that pregnancy can be recognized as early as ten to fourteen days after conception ; that the report on any given specimen can be dispatched after twenty-four hours, forty-eight hours, or five days, according to the particular test made ; and that all that is required as test material is 50 c.cm. of morning urine.

The interest of this work is not commercial ; it is to be found in the unusual and the exceptional ; for in these cases is the seed of knowledge which, being disclosed, will contribute largely to the endocrine therapy of the immediate future.—I am, etc.,

F. A. E. CREW.

Institute of Animal Genetics,
Edinburgh, Sept. 5th.

Alkali Reserve in Asthma

SIR,—In his article in the *Journal* of August 18th (p. 299) Dr. Moll inclines to the opinion that in asthma there is a tendency to alkalosis. In support he repeats the well-known arguments about the rarity of asthma in certain diseased states known to be accompanied by acidosis. These are indirect and not convincing. More direct are McDowall's experiments on animals, in which bronchospasm was produced by alkalis, and Tiefensee's similar experiments. Tiefensee also claims, in support of an alkalosis, clinical proof based on biochemical findings. So far as I know these have not been confirmed.

Since the publication of his paper I have tried to find evidence of alkalosis mainly by the van Slyke method of determining the CO_2 combining power of blood plasma.

If this method, as carried out for me on seventy-two patients by Miss Jean Small, B.Sc., at Stobhill Hospital, is to be relied on, then the indication is quite frankly for an acidotic tendency. *There never has been the slightest evidence of alkalosis.* The normal range of figures for adults is given by Hawk as 53 to 80. Forty-nine patients gave a reading under 53—that is, nearly 70 per cent. gave a distinct indication of acidotic *tendency*. The readings may be summarized thus:

Under 45	45–50	50–55	55–60	60 or over
8	13	40	10	4

Not only do these values speak for themselves but usually the more prolonged and severe the asthma the lower was the figure: as the asthmatic improves his alkali reserve rises and his eosinophilia usually falls. The four values of 60 and over were 61, 61.3, 60, 61, and their respective eosinophilia percentages were only 5, 4, 2, and 8: in all the asthma was slight and at infrequent intervals (weeks). On the other hand, a man with severe asthma and a 12 per cent. eosinophilia had the low reading of 40 for his alkali reserve, and died in status asthmaticus.

Further evidence in favour of acidosis is (1) the increase of ammonia-combined acid in the urine, as recorded by Oriel and myself, and (2) the effectual treatment of her asthmatic patients by Dr. Flora Innes of Vellore, India, who gives drachm doses of sodium bicarbonate in large draughts of water with fruit juice every two or three hours; the dyspnoea quickly disappears, as also, she claims, does the achlorhydria, which is such a frequent feature in chronic asthmatics. Oriel also recommends sp. ammon. aromat., a volatile alkali. Benefit from HCl is likely to be due not to meeting an alkalosis but to meeting the gastric subacidity. My findings in this respect agree with Bray's—48 per cent. hypochlorhydria, and 26 per cent. achlorhydria, a total of 74 per cent. with gastric subacidity.

It will be interesting to know the findings of other observers as regards the alkali reserve; and, if these confirm mine, to learn how those who champion alkalosis explain the low figures for severe asthma and *the rise of the alkali reserve with clinical improvement*.—I am, etc.,

Glasgow, Aug. 31st. JAMES ADAM.

Is High Blood Pressure a Risk?

SIR,—In your issue of September 8th Dr. Thomas Robertson states that "anyone who has followed the trend of medicine for the last twenty years knows that . . . insurance companies are asinine." The ground for this statement, so far as I can gather, appears to be that they are chary of accepting, at ordinary rates, proposers with high blood pressure, in spite of the fact that some such cases live to a good old age.

Dr. Robertson agrees that "statistical investigations doubtless prove high blood pressures to be dangerous, but when it comes to a given patient there is no criterion whereby to judge the prognosis." If this is correct, surely the companies are justified in their attitude? Suppose they were offered a group of men aged 50, each with a systolic pressure of 200, but otherwise apparently healthy. They have every reason to suppose that the mortality experience in this group would be greatly in excess of the normal. Should they accept them at ordinary rates because some of them are likely to live long? Take a comparable example. If there were another great war, and 1,000 young soldiers wished to insure at ordinary peace rates, should they be accepted because some of them were almost certain to survive its dangers?

Until Dr. Robertson, from his observations on the trend of modern medicine, can teach the companies to differentiate the good from the bad in a group of hyperpietics, they are likely to continue the "asinine" practice he seems to deplore.—I am, etc.,

London, E.C.1, Sept. 8th. OTTO MAY.

SIR,—An *Epitome* paragraph entitled "The Prognosis for High Blood Pressure," which appeared in the *British Medical Journal* of February 6th, 1926 (para. 142), may interest your correspondent of August 25th, and seems worth quoting. It runs as follows:

R. Shiström (*Ugeskrift for Laeger*, November 19th, 1925, p. 1038), as the result of a study of over 300 cases of high blood pressure, finds that the average age at which this condition begins to make itself felt by the patient is 52 years, but that before this age the high blood pressure has existed for about ten years unobserved by the patient. The average age at death of this class of patient is about 62 years; thus from the beginning to the end of this condition there is apparently about two decades of life. Life may, however, last as long as twenty-five to forty years, and in twenty of the author's cases in which he kept in touch with the patient for ten to sixteen years the blood pressure was seldom or never below 200 mm. of mercury, although most of the patients were well and fit for work during the greater part of this time. The author insists that the patient whose high blood pressure begins at the age of 50 and lasts for twenty years or more can hardly complain that this condition has shortened his life, seeing that at the age of 70 he has already exceeded the average expectation of life. Factors affecting the prognosis unfavourably are an early onset of the high blood pressure, the coexistence of syphilis, and disease of the kidneys. In most cases it is impossible to decide whether the disease is progressive or not, and the physician is therefore not justified in giving a grave prognosis.

—I am, etc.,

London, S.W.11, Sept. 7th. M.B., Ch.B.Ed.

Is the Taking of Blood Pressure a Risk?

SIR,—With reference to the letter by "M.S., F.R.C.S." in the *Journal* of August 25th, the answer, as I shall show, is in the affirmative when the blood pressure is being taken in elderly persons with signs of cardiac weakness. Here are two cases which occurred in my practice two years ago.

The first was a patient aged 74. He was a retired tradesman who had led a decent life except that he had for a time drunk too much whisky. He had gradually been getting weaker. He had no definite disease, although his heart showed signs of degenerative changes. I got one of our leading consultants to see him. After a careful and exhaustive examination he proceeded to take his blood pressure. We had only left the bedside one or two minutes when we were urgently recalled. We found the patient quite unconscious, his face blue, and after one or two gasps he was dead.

The second case was more appalling. He was an artist about the same age, who had led a perfectly good life. His condition was similar to the first case. I got the same consultant to see him. When we entered the bedroom he was sitting up in bed, and on seeing us he smiled and remarked, "I do feel a fraud, two doctors coming to see me and I feeling so well." These were his last words. While the consultant was taking his blood pressure I chanced to look at the patient. On calling the consultant's attention to the patient's discoloured face he released the instrument, but it was too late—he was dead.

In the first case the blood pressure reading was: systolic, 170 mm. Hg; diastolic, 105 mm. Hg. In the second case, systolic, 140; diastolic, 120.

In both these cases death was certified as due to coronary thrombosis. As far as I know this danger has not been pointed out before.—I am, etc.,

West Bridgford, Nottingham, Sept. 3rd. W. HUNTER, M.D.

Haemorrhage from Peritonsillar Abscess

SIR,—Surely Mr. T. G. Wilson (September 8th, p. 491) misreads his "Cunningham" when he says that the tonsil is partly supplied by the descending palatine branch of the internal [*sic*] carotid artery. The internal carotid artery has no such branch, and the vessel named arises from the external carotid in the spheno-maxillary fossa.

In any case the contribution of the descending palatine artery to the tonsil is negligible when compared with that of the ascending pharyngeal artery, the facial artery by its ascending palatine and tonsillar branches, and the lingual artery by its dorsalis linguae branch.

Mr. Wilson's reason for ligaturing the common carotid artery would hardly appear valid unless associated adenitis made exposure of the external carotid too difficult, which does not appear to have been the case. The external carotid should be chosen for ligature, due regard being paid to the partly concealed and often very low origin of the ascending pharyngeal branch.—I am, etc.,

Canterbury, Sept. 10th. THOMAS A. CLARKE.

SIR,—During recent renovations at my house, where Dr. J. H. Watson once had consulting rooms, the enclosed fragment was discovered among the deeper strata of *Fishery Gazettes* accumulated in the waiting-room. Apart from the intrinsic interest, it appears to have a bearing on a recent correspondence in your pages upon Haemorrhage from Peritonsillar Abscess.

". . . a small monograph on *Inductive Reasoning as Applied to Anatomy*. The section upon the tonsil, for instance, points out that it is very like a lymph gland in structure; and, like a lymph gland, bleeds very little when cut. We should therefore expect to find a similar scanty blood supply from a single artery entering at a similar hilum where the veins emerge. It is exposed to the force of gravity and the tug of swallowing, both acting in the same direction. There should therefore be, as elsewhere in the body, both a muscular suspension and a fibrous ligament to counter these forces. Abscesses are apt to form round its upper half, so that on the analogy of perirenal and orbital suppurations there should be an areolar space surrounding it. The absence of these abscesses round its lower half would presumably show that it is there that our hypothetical muscular suspension is attached to the capsule. Dangerous bleeding may occur on one side and not on the other after the removal of identical tonsils by identical methods. Therefore this bleeding comes not from a vessel that supplies the organ, but from an independent one that may or may not be wounded, as the common facial vein may or may not escape injury in the removal of the glands of the neck. The bleeding is slow and persistent; such bleeding comes only from a vein. The narrow calibre and contractility of small arteries prevent any great loss of blood from them, just as their thick walls render them less liable than veins to perforation in surrounding sepsis."

"But, Holmes," I broke in, "bleeding after tonsillectomy is spoken of by all the authorities in terms of arteries, not of veins." Without even a glance in reply he continued, "We therefore have cause to suspect the common occurrence of a medium-sized vein, unaccompanied by an artery, running close to the capsule of the tonsil, in the areolar tissue between its upper half and the palate muscles. This vein would cause the persistent bleeding noted either after tonsillectomy or the bursting of a peritonsillar abscess, and controlled by ligature of the external carotid. It would also account for the disproportionate number of deaths under local anaesthesia for tonsillectomy; the unwary surgeon being liable to inject his drug almost directly into the heart."

At this point I began to wonder whether Holmes's mixing of cocaine with his morphia, against which I had more than once warned him, had at last affected his once brilliant brain. And his next remark, as to confute his wild ramblings I reached down the revered and well-thumbed volume of Cunningham from my shelves, only served to confirm this sad suspicion. "If one were to describe exactly what one finds in the human body, uncaring whether or not it agrees with the books . . ."

Here the fragment ends.—I am, etc.,

London, W.1, Sept. 8th. DENIS BROWNE.

Orthopaedic Treatment of Infantile Paralysis

SIR,—In these observations I particularly desire to draw attention to those developed cases of extensive muscle weakness in the lower limbs which six months after the onset of this disease show few clinical signs of recovery.

For example, a child of 6 years of age is found at the original examination to have apparently no power of movement in the left leg, and in the right leg movement of toes only. After six months of complete rest (recumbency on a satisfactory splint), competent trained nursing, and orthopaedic supervision the following condition is found: there are still no signs of recovery of voluntary power in the left leg, but in the right are found early evidences in all the muscle groups. At this stage a complete return of normal muscle function in the right leg is unlikely, while the prognosis as to any improvement in the left leg has to be most guarded. Due consideration having been given to this difficult subject of prognosis the time has arrived for anxious thought regarding the future of a patient who is obviously going to be grossly handicapped in the struggle for existence. It has become necessary to plan the life and the treatment of the individual for ten or twenty years in advance. The earlier this problem is faced in all its aspects—medical, financial, and educational—the better for everyone concerned.

It has been my privilege to supervise personally the orthopaedic treatment of cases of this description from early childhood up to adult life, and I strongly advocate that "the long view" must be taken with every patient. During this extended treatment the essential aims to be kept in view are the following. First, the prevention of any deformity, especially one of a crippling nature; secondly, the ultimate attainment of the power of walking in a manner approaching as closely as possible to normal; and, thirdly, education in a manner best suited to ensure the capacity for earning a living.

The crux of the problem is contained in the following statement. All the essentials enumerated above are obtainable for the majority of these cases of lower limb paralysis if weight bearing is deferred until it is reasonably certain that no further gain in muscle power is possible, and that no gross muscle fatigue is likely to result. The time limit for recumbency will be a variable factor in each individual case and with individual professional experience, but I have no hesitation in advocating a minimum period of two years in every case of lower limb paralysis. In severe cases, as in the example quoted above, this period may be extended to three, four, or even five years. The only standard must be the capacity of the injured limbs to support the weight of the body. No other problem in the whole course of treatment approaches this in importance, and an error of judgement in this particular may mar the whole future life.

Too early weight bearing will cause fatigue, produce muscle weakness and deterioration, and possibly precipitate a state of crippledom which no after-treatment can wholly remedy. It is a very hard struggle to convince parents and others of the necessity "to hasten slowly" before taking this vital step. They see considerable improvement in the child's condition while strict recumbency is being maintained, and constantly desire to know when the child will be allowed to stand.

This dangerous importunity must be resisted and the plan previously mapped out stubbornly adhered to. A constant propaganda explaining the evils of too early weight bearing has to be carried on. Lest my proposition should appear fantastic, I may point out that in the case of tuberculosis of the hip-joint it has been brilliantly successful. All concerned with the treatment of tuberculosis of this joint have been educated to appreciate that there is no time limit for treatment. The moment for weight bearing in this disease is left absolutely to the judgement of the surgeon. Muscle and bones, which are grossly weakened following upon an attack of infantile paralysis, are at least equally as important as

infected joints and worthy of the same careful treatment. Looking ahead and visualizing the adult life of the individual, what is the loss of these early years in childhood compared with the certainty that the maximum amount of recovery possible has been obtained. These weak lower limbs, with or without the assistance of steel splints, crutches, etc., will ultimately be required to support the weight of a body, often proportionately well developed, throughout the remainder of the patient's existence.

Recumbency on a splint of the type of the late Sir Robert Jones's abduction frame, modified to suit individual cases, is the ideal position of rest. During this extended period of rest the problem of obtaining movement without weight bearing and with gradually increasing power and range must be tackled with confidence. This is the method of treatment known as muscle re-education, with its principles of the zero position of muscle, the stress laid on the action of gravity as a factor in all muscle work, and the conception that by very gradually increasing the load a muscle has to bear it is possible to blow into flame any tiny spark of movement. Originally described by Sir Colin Mackenzie more than twenty years ago, and since then constantly advocated and demonstrated by both of us, these methods are now widely known and practised wherever the treatment of paralysis has been modernized.

An attempt has been made in this review to show the life of a sufferer from the effects of infantile paralysis in perspective. No considerations of a financial character have been allowed to interfere with what is held to be the only method of treatment which will prevent the distressing crippledom, still all too prevalent as an aftermath of this disease. A comparison with treatment of tuberculosis of the hip-joint has been instituted to show that this ideal treatment advocated is not possible of achievement. In conclusion, I wish to emphasize that at no stage in the treatment of the extensive muscle weakness caused by this disease can we say that treatment is finished. These patients must be seen at frequent regular intervals after weight bearing has been permitted, and must be carefully overhauled to prevent the development of insidious muscle maladjustments. Considering its overwhelming importance in the plan of treatment, a plea for "the long view" cannot be made too strongly.

—I am, etc.,

CHARLES MACKAY, M.D.Melb.

Malaga, Spain, Aug. 29th.

Sodium Evipan

SIR,—We have used sodium evipan with complete satisfaction in a number of cases of Arabs and Jews, and as the results merely confirm the observations of others there is no need to detail them, except perhaps to note in passing that the oral administration of morphine grain 1/4 a few minutes before the operation seems greatly to lessen the "drunken" effects experienced by some nervous subjects on emerging from evipan anaesthesia. Two cases are, however, worth noting briefly.

1. A male Arab, aged 45, believed to be slightly mentally defective, reached us in a very toxic state by reason of a tropical ulcer which had eroded the tibia shaft and the whole of the postero-lateral aspect of the left leg. As inhalation anaesthesia seemed to be contraindicated sodium evipan was chosen, since amputation was imperative. The patient died of cardiac collapse before the operation was started, although the usual precautions had been observed. It is not possible to exclude the idea that he would have died within a matter of hours even without any anaesthetic, but the case must be recorded as a death under this anaesthetic.

2. A male Arab, aged 28, arrived in a state of constant spasm due to tetanus. His symptoms were seven days old at the time of admission. He was rigid from occiput to heels, the jaw being fixed and the arms flexed at the elbows, so that the clenched hands were above his head, and both in spasm. Treatment consisted in intramuscular magnesium sulphate (5 c.cm. of a 25 per cent. solution) every five hours, 3,000 units of antitetanic serum daily (this serum is limited in supply in Aden), morphine grain 1/4 at first twice a day, and 10 c.cm. of sodium evipan solution each evening. The continuous spasm gave place to spasm every three minutes, and thereafter the patient made an uneventful recovery. We believe sodium evipan to be of definite value in tetanus.

—We are, etc.,

ROBERT NAPIER.
P. W. R. PETRIE.

Ion Keith Falconer Hospital, Sheikh Othman, Aden, Aug. 22nd.

Control of Prophylactic X-Ray Treatment in Breast Cancer by Serum Tests

SIR,—In your report of the proceedings of the Radiological Section at the British Medical Association Annual Meeting (*Journal*, August 11th, p. 275) I note that Dr. H. Guy Dain said that he doubted the value of repeated *x*-ray treatment after radical mastectomy for carcinoma of the breast. It must be admitted that prophylactic post-operative treatment by *x* rays has in the past been of an empirical nature. While the failures have been evident it has always been open to opponents to claim that those patients who have survived a long time would in any case have done so. Workers who believed that resistance to metastases could be increased by small doses of *x* rays had no means of putting their views to the test of laboratory findings. Statistics, as usual, have been quoted by upholders, and destructively criticized by opponents. The time has now come, however, when advances in biochemistry make it not only possible but incumbent upon us to take note of the constitutional effects of *x*-ray treatment, so that we may decide in any given case what is to be aimed at—that is to say, whether we are to use radiation in concentrated form over a strictly limited area in order to maintain a local reaction; or over a wide field, employing low intensity, to alter the metabolism of the body.

The study of *x*-ray effects on the blood in certain diseases can now be carried out by means of a modification of the Bendien tests. These tests have been described in detail in the *British Medical Journal* (1933, i, 407, 536) by Dr. Cronin Lowe. It was, I believe, Dr. Lowe who first suggested that the vanadic acid test might be used not only as a means of telling when a breast cancer patient was in danger of a metastatic outbreak, but also as a means of gauging the patient's response to *x* rays or other therapeutic measures. The precise value of the tests in differential diagnosis need not be discussed here, because we are dealing with cases in which the nature of the disease is known. In order that it should be valuable as a control for *x*-ray therapy it is necessary: (*a*) that the test should be positive in nearly all cases with active lesions, either primary or metastatic; (*b*) that it should become negative in a certain proportion of cases of operative removal or local disappearance under radium or *x* rays; and (*c*) that where it remains, or again becomes, positive, local or metastatic recurrence should usually take place in the course of a few months. Drs. Cronin Lowe, Harry Coke, and others who have experience of the tests state that these criteria are fulfilled: if radiologists wish to try out the tests as a therapeutic control they must assume, as a working hypothesis, that the statement is correct.

During the past six months every case of cancer of the breast which has come under my care, whether in hospital or in private practice, has been subjected to the vanadic acid test at the hands of Dr. Harry Coke. As a result of over forty blood examinations I am prepared to make certain statements with regard to the test.

1. It has been positive in all cases which showed clinical activity. Here *x*-ray treatment has improved the blood picture, but not made it fully normal.

2. The test has also been positive in some post-operative cases which showed no clinical evidence of disease. In some of these cases a satisfactory blood picture has been restored by *x* rays; in others there has been improvement only. So far none in this group has developed macroscopic metastases.

3. The favourable response is due to some generalized action, and is brought about by small repeated doses over a wide field. It is extremely easy in susceptible patients to make the blood picture worse, though if this is detected in time no harm is done, as it improves on cessation of the treatment. The lesson taught is that *x*-ray dosage for constitutional purposes requires individual control.

In breast cancer the control of metastases is the ultimate problem. If the vanadic acid test really gives us an indication of metastatic activity in its microscopic stages, there is a chance of doing something in time. We do not yet know if obvious secondaries can at times develop in the face of a normal blood picture, nor do we know for how long we can maintain a normal blood picture in cases where *x*-ray treatment has brought it back from an abnormal state. But it would seem just as rational to make repeated blood tests in the case of carcinoma mammae, and act accordingly, as it is to do Wassermann tests in the case of a patient who has been "cured" of syphilis. The vanadic acid test may help to abate the controversy between those who say "let well alone" and those who retort that one can never be sure that all is well. Unless and until the test can be proved valueless as an indication of latent secondary mischief, he would be a bold man who would refuse to take some action in the case of a patient apparently in good health but showing an unfavourable blood picture.

In conclusion, I should like to point out that the above remarks have no bearing upon the question of localized dosage in other forms of cancer, or even upon the dosage requisite for the primary growth in cancer of the breast itself when that is dealt with by radiation.—I am, etc.,

London, W.1, Aug. 26th. F. HERNAMAN-JOHNSON.

The Swab in Diphtheria Diagnosis

SIR,—Your kind reference to my method in last week's *Journal* (p. 476) has suggested to me that it might be advantageous if I were to offer to supply to bacteriologists who have not used it some of the stain, together with notes on its application. I write to say, therefore, that I shall be delighted to do so to anyone who cares to write to me direct. I believe samples of toluidin-blue vary in their suitability for this method of staining, and it is therefore important to have a reliable brand. Your article brought out one important point which I had omitted from my letter—namely, its value for immediate diagnosis of Vincent's angina.—I am, etc.,

CONSTANT PONDER.

Sessions House, Maidstone, Sept. 10th.

SIR,—It appears that my letter on this subject has been misunderstood to some extent. I did not wish to convey the idea that the taking of swabs should be abolished; my intention was to infer that, while a swab should be taken, the greatest care should be exercised in the event of a negative report before the case is definitely classified as not being diphtheria, and that in making a diagnosis the bacteriologist's report must be considered in conjunction with the clinical aspects of the case.—I am, etc.,

Bridport, Sept. 8th. J. C. T. SANCTUARY.

Obituary

CARL OLAF JENSEN, M.D.

Director of the Serological Laboratory, Danish Veterinary and Agricultural College

The announcement of the sudden death of Professor C. Olaf Jensen in Copenhagen on September 3rd must have awakened feelings of intense regret in the minds of thousands, and especially among medical men and veterinary surgeons.

Professor Jensen achieved world-wide fame by his researches regarding the experimental transmission of cancer, but these occupied only a small part of his active life, which was mainly devoted to the study of the contagious diseases of the domesticated animals. In a lecture delivered in Copenhagen in 1901, and more fully in a paper published in 1903, he showed that a malignant tumour occurring in mice could be readily transmitted to healthy animals of the same species by inserting a small particle of the tumour under the skin—a process he named "transplantation" to distinguish it from inoculation. The tumour in question was a carcinoma or adenocarcinoma, and the new growths which developed from the transplanted particle were found to be of the same nature as the naturally occurring tumours in mice. It was furthermore proved that by this process of transplanting or grafting the tumour could be transmitted in series through many generations, if not indefinitely. The cells of the experimentally produced tumours showed the capacity for uncontrolled multiplication which is now recognized to be the property that distinguishes the cells of malignant new growths from those of the normal body.

Jensen's success, where others had failed, was due to the fact (1) that the attempts to transmit the tumours were made with animals of the same species, and (2) that the method of transmission adopted was that of transplanting or grafting of the living tumour cells. It would scarcely be possible to exaggerate the practical importance of Jensen's great discovery. Its value lay not in what the experiments proved in regard to malignant tumours in mice, but in the fact that it pointed the new way in which researches regarding malignant tumours in animals might profitably be pursued. In fact, a large part of the new knowledge regarding malignant neoplasms since 1901 has been obtained by investigations on the lines suggested by the pioneer work of Jensen. It was he who discovered that the cancer cells of the mouse tumours possessed a remarkable viability compared with the ordinary cells of the body, and remained alive at ordinary temperatures for many days after removal of the tumour. This made it possible to transmit what may be called the seeds of Jensen's mouse tumours from Copenhagen to laboratories in other parts of the world, including those of the Imperial Cancer Research Fund in London. In this way there began a period of intense experimental study of cancer problems in which the method initiated by Jensen played a prominent part.

His other contributions to animal pathology included valuable papers on braxy (1896), diarrhoea in young calves (1891, 1892, and 1911), necrobacillosis (1897), and contagious bovine abortion (1933). All of these papers embodied results of the author's original investigations, and he was the first to prepare specific antisera for use against the first two diseases. The paper on contagious abortion was his latest contribution to veterinary literature; in it he reported the results of experiments in the use of vaccines for the prevention of contagious abortion, and drew conclusions very adverse to the method that has been extensively practised in this and other countries.

THE LATE DR. R. A. GIBBONS

The obituary notice published last week (p. 493) should have mentioned Dr. R. A. Gibbons's long and valued association with the Medical Insurance Agency. He was elected to the Committee of Management on November 21st, 1918, and thenceforward continued to attend its meetings with great regularity. A few further biographical details of Dr. Gibbons's career have been sent to us by a member of the family. His father was Commissary General David Gibbons in the English Army, and his mother was Elizabeth Frances, daughter of Captain James Ireland-Wilkinson, R.N. It was merely owing to the accident of his father being stationed in Canada for a few years, in a military capacity, that he was born there ; he was brought to England while a baby in arms. His parentage was of Scottish origin, and he was brought up in Edinburgh.

On August 12th, at his home at Snainton, Yorks, the death took place of Dr. GEORGE HARDWICKE, aged 58 years, after a long and tedious illness. Dr. Hardwicke completed his medical education at the General Infirmary at Leeds, taking the diplomas of M.R.C.S. and L.R.C.P. in 1897. During the same year he won the prizes in medicine, surgery, and midwifery. After qualification he held the following appointments: house-physician, General Infirmary at Leeds ; resident surgical officer, Ida Convalescent Home ; senior house-physician, Leeds Public Dispensary ; and assistant resident medical officer, Leeds City Fever Hospitals. In 1917 he received a commission in the R.A.M.C. and held the rank of captain, served with the 83rd Field Ambulance, 21st Division, Salonika, and was mentioned in Sir G. F. Milne's dispatches. While on active service he contracted the illness from which he eventually died. Dr. Hardwicke went to Snainton thirty years ago, and during that time played a prominent part in the life of the countryside. He was keenly interested in sport, and was a recognized authority on the Yorkshire dialect, and had addressed the Society of Yorkshiremen in London and Lincoln on this subject, in addition to writing several short stories and sketches in dialect. Several years before the outbreak of war he became interested in Red Cross work, for which cause he did a great deal, and before joining the Army had charge of Wydale Auxiliary Hospital and Wykeham Red Cross Hospital. He had been a member of the Scarborough Division of the British Medical Association since 1899. During his life in Snainton he greatly endeared himself to all who came in contact with him. His understanding and ready sympathy with those in trouble will ever be remembered, and the loss is a great one to the whole countryside.

The Services

D.G.M.S. AUSTRALIAN MILITARY FORCES

The appointment is announced of Colonel Rupert Major Downes, C.M.G., V.D., as Director-General of Medical Services to the Military Forces of the Commonwealth of Australia, in succession to Major-General George W. Barber, C.B., C.M.G., D.S.O., who retires in November, 1934, on reaching the age limit.

General Barber was born in Prestwich, Lancashire, and began life as a sailor, but later had to abandon the sea owing to defective eyesight. He studied medicine in London at the Middlesex Hospital, and obtained the M.R.C.S., L.R.C.P. diplomas in 1891. He then joined the P. & O. Line as a ship surgeon and spent some years at sea. In 1895 he settled in the goldfields at Kalgoorlie, Western Australia, where for many years he was Government Medical Officer. In 1911 he commenced private practice in Perth, where, as at Kalgoorlie, he achieved a wide reputation as a general practitioner and surgeon. The third phase of his career began in 1900 when he joined the Australian Army Medical Corps. On the outbreak of war in 1914 he was mobilized as senior medical officer of the Fremantle Garrison. He left Australia in December, 1914, with the Second Australian General Hospital, and served in Egypt, Lemnos, and Gallipoli with the rank of major. After the evacuation of Anzac he was A.D.M.S. of the 4th Australian Division, with the rank of colonel, and served in France till the end of the war. In April, 1918, he was appointed D.D.M.S. of the Australian Corps, and gave signal service in this capacity. On returning to Australia he was appointed D.D.M.S. of Western Australia, and in 1925 he succeeded Sir Neville Howse as Director-General of the Medical Services for the Commonwealth. General Barber was awarded the Orders of the C.B., C.M.G., and D.S.O., the French Croix de Guerre, and was mentioned in dispatches eight times.

Colonel Rupert Downes also had a career unusual for a medical man. His father, Major-General M. F. Downes, C.M.G., served in the Royal Artillery in the Crimean War, and after acting as Commandant of South Australia became Secretary of Defence for Victoria and then Commandant of Victoria during the period of the South African War. Colonel Rupert Downes was born in Adelaide in 1885, and was educated at Haileybury College, Melbourne. As a resident in Ormond College he graduated M.B., B.S.Melb. in 1907. He obtained his University blues for cricket and tennis. After graduation he became surgical tutor at Ormond College, and proceeded M.D., M.S. Practising in Melbourne as a consulting surgeon, he held several surgical hospital appointments, and at the time of his appointment as D.G.M.S. he was in-patient surgeon at the Children's Hospital, Melbourne, and consulting surgeon to the Eye and Ear Hospital. Among his other appointments are those of Commissioner of the St. John Ambulance Brigade and president of that association, chairman of the Board of the Victorian Branch of the Australian Massage Association, member of the Council and vice-president of the British Medical Association (Victorian Branch), and lecturer in medical ethics. His military record dates from 1900, when, as a boy trumpeter, he enlisted in "B" Battery, Victorian Field Artillery, with which he served for eight years. In 1908 he obtained his first commission in the Australian Army Medical Corps, and was an enthusiastic medical officer during the pre-war years. Shortly after the outbreak of war he volunteered for active service, and his first command was the 3rd Light Horse Field Ambulance in 1914–15 in Egypt and Gallipoli. Before the evacuation he was appointed A.D.M.S. of the New Zealand and Australian Division at Anzac. After the evacuation he was appointed A.D.M.S. of the Anzac Mounted Division in Egypt and Palestine, and later held the appointment of D.D.M.S. of the Desert Mounted Corps in Sinai, Palestine, and Egypt. He was thus responsible for the medical services of the greatest mounted force ever assembled in modern times. Towards the end of the war he was D.D.M.S. of the A.I.F. in Egypt. He was awarded the C.M.G. and mentioned in dispatches four times. In the Commonwealth Military Forces since the war he held the appointment of D.D.M.S., Third Military District (Victoria), from 1921 to 1934. He was a member of the Committee on Reorganization of the Medical Service in 1920 and the representative of the medical profession on the Commonwealth War Book Committee. He has also held the appointment of honorary surgeon to the Governor-General.

It must be understood that in Australia, in contradistinction to the practice in Britain, there is only one medical officer in the permanent military forces in the person of the D.G.M.S. The remaining appointments are filled by citizen soldiers. This service makes a considerable demand on the time and energies of men in active medical practice, with the result that a great proportion of the administrative work is done by officers and warrant officers of the permanent forces without medical training.

43RD FIELD AMBULANCE DINNER

The committee responsible for organizing a reunion of members of the 43rd Field Ambulance, R.A.M.C., has decided to hold a dinner at the Grosvenor Hotel, Deansgate, Manchester, on Saturday, October 27th, at 6 p.m. Price of ticket, 5s. 9d. ; evening dress optional. To enable the committee to assess the number who will be present, applications for tickets, with remittance, should be made before October 15th to Mr. W. C. Dickson, 76, Boswall Drive, Edinburgh.

DEATHS IN THE SERVICES

Brevet Colonel Charles Bunbury Lawson, late R.A.M.C., died in London on July 30th, aged 66. He was born at Ballingarry, Ireland, on August 3rd, 1867, and was educated at Edinburgh, where he graduated M.B., C.M. in 1889. Entering the Army as surgeon lieutenant on January 30th, 1892, he became lieutenant-colonel on August 3rd, 1914, got a brevet as colonel on February 18th, 1915, and retired on April 10th, 1920. During his career he specialized as a radiologist. He was medical officer to H.R.H. the Duke of Connaught while commander-in-chief in the Mediterranean; pathologist and radiologist to the Royal Herbert Hospital, Woolwich, in 1903; examiner in surgery, pathology, and radiology to the Royal Army Medical College at Netley in 1903; and pathologist, radiologist, and surgical specialist at Malta from 1903 to 1908. He held the same offices at the Royal Victoria Hospital, Netley, 1908 to 1912; and also, after the war, at Colchester in 1918–20; and was radiologist and medical assessor to the Ministry of Pensions in 1923–5. He served in the South African War in 1899–1900, when he took part in the advance on Kimberley, and received the Queen's medal, with a clasp; and in the war of 1914–18, when he was mentioned in dispatches in the *London Gazette* of February 17th, 1915. He was for forty-one years a member of the British Medical Association.

Medical News

Dr. Henry MacCormac will deliver the introductory address, entitled "Our Profession," at the opening of the winter session of the Middlesex Hospital Medical School, at the Queen's Hall, Langham Place, on Monday, October 1st, at 3 p.m., after which Sir E. Farquhar Buzzard, Bt., will distribute the prizes. The annual dinner takes place the same day at 7.30 o'clock at the Savoy Hotel.

The Westminster Hospital Medical School annual dinner will be held at the Trocadero Restaurant on Saturday, September 29th. A special post-graduate course for old students has been arranged for Saturday, September 29th, and Sunday, September 30th. The inaugural address will be given by Sir John Simon in the Central Hall on Monday, October 1st, at 3.30 p.m.

The annual dinner of past and present students of King's College Hospital Medical School will be held on Saturday, September 29th, at 8 p.m., at the Connaught Rooms, with Dr. Wilfrid Attenborough in the chair. An intensive post-graduate course will be held on Saturday, September 29th, 12 to 6 p.m., and on Sunday morning, September 30th, to which members of the school and other practitioners are invited. A series of post-graduate lectures, free to all practitioners, will be delivered in the lecture theatre on Thursdays, at 9 p.m., from October 11th, 1934, to April 4th, 1935. The opening lecture will be given by Mr. Cecil Wakeley. Subsequent lectures will be announced weekly in our medical diary.

The thirteenth reunion dinner of the British Serbian Units Branch of the British Legion will be held on Thursday, September 27th, at the Lysbeth Hall, Soho Square, London, at 7.30 p.m. Lieut.-Colonel A. E. Kidd will preside, and a large party of ex-servicemen from Yugoslavia are expected to be present. Tickets may be obtained from Miss Marx (24, Melcombe Court, Dorset Square, N.W.1). All friends of Serbia are welcome.

The next extra-metropolitan dinner of the University of London Medical Graduates' Society will be held on Friday, September 28th, at 7.30 p.m., in Queen's College, Cambridge. Members should apply for tickets, enclosing the sum of 8s. 6d., to the honorary secretaries not later than September 24th, at 11, Chandos Street, Cavendish Square, W.

The annual address at the Central London Throat, Nose, and Ear Hospital (Gray's Inn Road, W.C.) will be given by Mr. Douglas Harmer on Friday, October 12th, at 4 p.m. His subject is "Treatment of Malignant Disease in the Upper Jaw."

The fifteenth Norman Kerr Memorial Lecture will be delivered before the Society for the Study of Inebriety by Sir Malcolm Delevingne, lately British Representative on the Opium Advisory Committee of the League of Nations, on Tuesday, October 2nd, at 4 p.m., in Friends House, Euston Road, N.W. His subject is "Some International Aspects of the Problem of Drug Addiction." Each member and associate is at liberty to introduce visitors.

The London County Council announces that a three-months' course of lectures and demonstrations in connexion with instruction in hospital administration for the D.P.H. will be given at the North-Western Hospital, N.W.3, and at the Brook Hospital, S.E.18, from October 1st, on Mondays and Wednesdays at 9.30 a.m., and alternate Saturdays at a time to be arranged. These courses comply with the requirements of the revised regulations of the General Medical Council, which came into operation in 1931, and the fee for each is £3 13s. 6d. A course may, however, be taken under the previous regulations at a fee of £4 4s. Medical men desiring to take either course must pay beforehand the requisite fee to the Medical Officer of Health, London County Council, Public Health Department (Special Hospitals), County Hall, S.E.1, giving full name and address.

The following international medical post-graduate courses have been arranged for October by the Berlin Academy for Medical Post-Graduate Training, under the auspices of the Lord Mayor of Berlin, and in succession to the Society of Lecturers for Medical Post-Graduate Training in Berlin: Internal medicine, with special regard to tuberculosis, from the 1st to 13th—fee, RM. 60; course in tuberculosis in the tuberculosis hospital of Berlin, Waldhaus Charlottenburg, in Sommerfeld, from the 15th to 20th—fee, RM. 50 (accommodation and board can be obtained for RM. 2.7 per day); obstetric-gynaecological post-graduate training week, from the 15th to 20th—fee, RM. 50; course in diseases of the ear, nose, and throat, from the 1st to 13th—fee, RM. 120; course in paediatrics, from the 22nd to 27th—fee, RM.50; surgical intrathoracic diseases, with special regard to pulmonary tuberculosis, from October 29th to November 2nd—fee, RM. 80. Individual courses in all branches of medicine with bedside and laboratory practice are held every month. The fee is RM. 50 to RM. 80 for eight lessons of two hours each, special attention being paid to practical work. Programmes and further particulars are obtainable from the Academy, Berlin, N.W.7, Robert-Koch-Platz 7 (Kaiserin Friedrich-Haus). German as well as foreign doctors can attend the courses, and foreign students obtain a reduction of 60 per cent. in fares from the German railways.

The Fellowship of Medicine and Post-Graduate Medical Association announces that lecture-demonstrations will be given at 11, Chandos Street, Cavendish Square, at 2.30 p.m. on Tuesdays as follows: "Hemiplegia" on September 18th and "Paraplegia" on September 25th. Forthcoming courses include chest diseases at the Brompton Hospital, September 24th to 29th; proctology at the Gordon Hospital during the same period; disease of children at the Queen's Hospital, October 1st to 13th; dermatology at St. John's Hospital from October 1st to 27th; and an evening series of lectures on physical medicine at the St. John Clinic and Institute of Physical Medicine during the same period. A course in medicine and surgery will be held at the Metropolitan Hospital from October 8th to 20th, and a week-end course in diseases of the heart and lungs at the Royal Chest Hospital on October 13th and 14th.

Post-graduate lectures and demonstrations will be given by members of the honorary staff of the Manchester Royal Infirmary on medical, surgical, and special subjects each week on Tuesdays and Fridays, from September 25th to December 18th. All lectures begin at 4.15 p.m. and are free. Details may be obtained from the secretary for the post-graduate lectures.

The thirty-fourth congress of the French Association of Urology will be held at the Paris Faculty of Medicine on October 8th under the presidency of Dr. Heitz-Boyer, when the subject for discussion will be orchi-epididymitis apart from syphilis and tuberculosis, introduced by Dr. Chauvin of Marseilles. Further information can be obtained from Dr. O. Pasteau, 13, Avenue de Villars, Paris, 7e.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to **The EDITOR, British Medical Journal, B.M.A. House, Tavistock Square, W.C.1.**

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QUERIES AND ANSWERS

Cholecystectomy and Recurrent Duodenal Ulceration

Dr. G. BREBNER SCOTT (London, S.W.16) writes: I have lately been a victim of the latest fashionable complaint—namely, cholecystitis with gall-stones. This necessitated the removal of my gall-bladder. Picturing in my mind the fact that now, instead of intermittent gushes of bile, I have a persistent seepage of bile bathing my duodenum, leads me to the rather alarming suggestion that cholecystectomy of a normal gall-bladder might be the best treatment for recurrent duodenal ulceration with its attendant and dangerous haemorrhages. May I ask your readers: (1) Do you know of any cases of duodenal ulceration following a cholecystectomy? If so, this would be fatal to my suggestion? (2) Do you know of any cases of duodenal ulceration associated with cholecystitis and cured after cholecystectomy had been performed? If so, may not my suggestion of cholecystectomy as a cure for recurrent duodenal ulcer be a feasible one?

After-effects of Continued Doses of Adrenaline

"L. H." asks: Can any of your readers who have observed the results of repeated injections of therapeutic doses of adrenaline over long periods, in cases of asthma and other conditions, state whether any permanent effects on the health—for example, due to rise of blood pressure or any other condition—are produced? It is known that rabbits are liable to develop degenerative changes in the aorta as the result of repeated intravenous injections of adrenaline, but these animals are also prone to arterial changes from many other experimental procedures.

"Nail-biting"

Dr. RICHARD EAGER (The Mental Hospital, Exminster) writes: With due respect to the psychological aspect of this vice and the old idea that it was an indication of "bad temper," I must heartily support the advice given by Major H. Williamson of Dorchester (*Journal*, August 18th) as to the suggested treatment of this condition. I have for long been convinced that the intolerable irritation caused by too long nails, split nails, or "hang-nails" starts the habit of biting or tearing as the only form of relief in certain children. A pair of pocket scissors or even a file (but preferably both) which can be carried about easily will, I am sure, do much to stop the formation of this habit if appropriate instructions be given to children in whom nail-biting has commenced. It is at all events more rational than the old-fashioned application of bitter aloes and the threats of punishment previously used.

LETTERS, NOTES, ETC.

Transport of Invalids by Air

Dr. A. LANDALE CLARK (London, W.1) writes: I was recently faced with the problem of transporting a patient, aged 20 years, from London to Zurich. The patient was in a very weak condition, having had one thigh amputated for extensive osteomyelitis. It was decided that the only way in which the journey could be accomplished was by air. In co-operation with the parents I approached Imperial Airways regarding the journey. It was finally decided to reserve the forward cabin in one of their newest type of four-engined aircraft. This cabin ordinarily accommodates ten passengers. By removing the backs of four seats it was possible to erect a wooden bed, complete with special mattress. The bed was six feet long and about three feet wide, and was fitted in such a position that the patient, in a reclining attitude, had a perfect view through the windows. In addition to the patient, there were in the cabin his mother, a male nurse, and myself, and we could with comfort have had two other passengers as well. The journey started at 7 a.m., from a nursing home in the West End of London, by motor ambulance to Croydon, where the patient was lifted direct from the ambulance bed to that in the aeroplane, it being perfectly easy to run the ambulance alongside. The actual air journey started at 8.5 a.m. and we reached Zurich at 2.15 p.m., having had half an hour's stop at Paris and a quarter of an hour at Basle. The weather was, on the whole, good. At Zurich an ambulance was waiting, and again it was possible to bring it alongside the aeroplane. The patient was in bed in the clinic there at 3.15 p.m. precisely. The whole journey did not cause any unpleasant symptoms whatsoever, the only drug administered during the whole period of transit being 1/4 grain of morphine, given half an hour before arrival at Zurich. The patient ate quite a good lunch on board, and his temperature that evening was only one degree higher than on several previous evenings in London. The next day the temperature was practically normal, and there were neither signs nor symptoms to show that he had been subjected to any undue strain or fatigue. The total expense of the journey was, I understand, between £70 and £80. Its ease and comfort were mainly due to the interest and trouble taken by members of the staff of Imperial Airways, in particular the Special Charter Department. I was shown a smaller machine, fitted nevertheless with three engines, which contained a full-length bed, besides accommodation for two other people; it can be hired as an aerial ambulance at the rate of 1s. 6d. a mile. I hope that this letter may be of service to some of my colleagues who may be faced with a similar problem.

Transport of Invalids by Railway

Dr. W. THOMSON WESTWOOD (Stretford, Manchester) writes: Dr. Maurice Campbell's experience (September 8th, p. 498) has been more fortunate than mine. I had recently occasion to have a patient moved from Manchester to Glasgow, where she was to undergo an operation immediately on arrival on account of acute cholecystitis. In spite of making every inquiry the railway company were only able to suggest taking two first-class tickets so that the invalid could ensure having one side of the compartment to herself, and as the train was expected to be busy they were unable to reserve a compartment. I should be glad to learn for future reference how these invalid coaches Dr. Campbell mentions are obtained.

Rectal Prolapse Complicated by Procidentia

Dr. D. J. CANNON (Kildare) wishes to correct a sentence in his letter under this title which appeared last week (p. 488). In paragraph 5 the fourth sentence should run: "In the female, then, if the lateral supports of the rectum are loose, complete prolapse of that organ will not occur provided the anal sphincter is intact. A high rectocele may occur instead."

Vacancies

Notifications of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 38, 39, 40, 41, 42, 43, 46, and 47 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 44 and 45.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page *168*.